

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper - Second-class postage paid at Chicago, Illinois

Vol IV No. 46

November 18, 1970

Price: \$9/year

Facilities Management Succeeds in Proper Environment

By Malcolm L. Stiefel
Special to Computerworld

In its proper environment facilities management can be immensely beneficial to the user, but facilities management can also lead to disaster.

- When used effectively, the facilities management user can:
- Save money.
 - Gain control over his data processing budget.
 - Be freed from personnel problems.
 - Benefit from technological expertise not otherwise available.
 - Gain control over the schedule of outputs.
 - Realize improvement in the timeliness and accuracy

of important reports.

Under the right circumstances these benefits can actually help the user make his operation more efficient.

Facilities management has been described as data processing services combined with management consulting. But a universal definition does not exist. In this series, CW examines this growing field in some detail, describing how facilities management works and its impact on the user.

But in the wrong environment, the user can:

- Lose money.
- Lose control over his data processing budget until he

throws the facility manager out the door.

- Multiply personnel problems.
- Lose all control of schedules.
- Have timeliness and accuracy of output degraded markedly.
- Wind up with no hardware, no software, no data processing personnel, no documentation and no data processing system, after the facility management company is banished.

Fortunately, such beatings haven't been administered very often. They can be avoided without much difficulty, but they have definitely retarded the progress of facilities management.

(Continued on Page 4)

Univac 1110 for Scientific and Business Usage

By Frank Piasta
CW Staff Writer



Operator at console CRT of multiprocessor Univac 1110 loads applications program into system.

NEW YORK - The latest model in a series of computers that goes back to the fifties, Univac's newest system, the multiprocessor 1110, is the most powerful yet, by a factor of at least five, over the 1108. The multiprocessor 1110 also indicates an increased awareness of the commercial EDP user's needs with the addition of byte handling and decimal arithmetic capability.

The 1110, Univac said, is designed for simultaneous batch, remote batch, demand, and real-time data processing, either for commercial or scientific applications. Software is upward compatible from the 1106 and 1108 computers.

The 1110 is a multiprocessor system with a basic configuration of two command arithmetic units (CAUs) and one input/output access unit (IOAU). This 2 by 1 system can be expanded to 2 by 2, 4 by 2, or 4 by 4 configurations. Each command arithmetic unit can perform approximately 1.7 million instructions/sec.

Additional Announcements

Concurrently with the 1110 announcement, Univac introduced two enhancements to the 1106 system, a multiprocessor version of the 1106 and a specialized version of the Exec 8 operating system called the 1106 Disk Resident System.

Also announced was a programmable communications and peripheral controller. Called the C/SP (Communications/Symbolic Processor), the new device will be able to handle communications for the entire 1100 series, and peripherals for the 1110.

Four new peripherals were announced for the 1100 series. These include a disk-pack subsystem with a capacity of more than 900-million characters, a 320K char/sec tape drive, a 1,000 card/min reader and a line printer that can handle a numeric character set at

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FJCC Opens in Largest Hall Ever

By Edward J. Brude
CW Staff Writer

HOUSTON - If you like the "wide open spaces," you'd be right at home in the Astrodome, site of this week's Fall Joint Computer Conference (Nov. 17-19).

The hall, together with the adjacent Astrodome, comprises the world's largest convention and exhibit facility, but will be less than half occupied when all is said and done.

Officials of the American Federation of Information Processing Societies (AFIPS), sponsors of

the computer conference, explained that the Astrodome has adequate space for 2,000 booths, but they had placed a maximum limitation of 1,000 so all exhibitors could return, if they so chose, when the convention will be held in smaller locations.

Even so, there are less than 850 booths scheduled for this conference, and about 265 exhibitors remain from last summer's 3,000 plus. About 100 of these are new faces, and AFIPS points to this fact as a sign of an expanding economy.

Officials also claim that early response for the 1971 spring conference, and late subscribers to this week's affair, substantiate their optimism.

The Houston location, a "first" for the conference, is expected to draw visitors who might have never attended a JCC. Texas provided only 4% of the attendees at last fall's conference in Las Vegas, and only 1% of the previous year's attendees in San Francisco.

Attendance Trends

In contrast, California provided 47% of the attendees at the Las Vegas conference, while Nevada

yielded 7%, and the year before, when the conference was in San Francisco, California provided a whopping 71% of the visitors and Nevada less than 1%.

Although "local" participation may increase, the general at

(Continued on Page 6)

Garbage Pickup, Traffic...

City Puts Computers to Work

CW Midwest Bureau

WICHITA FALLS, Texas - This Texas city may well turn out to be the most computerized city in the country.

Street repairs and traffic flow are computer controlled. A DP system does the tax assessments, voter registrations, police assignments, vehicle licensing, overdue library books, the garbage collections, and even the weed-pulling chores.

It's all part of a three-year, \$3 million federally funded program to discover if what works in Wichita Falls can work in other cities.

According to Assistant City Manager Jerry R. Dunn, who says that his city is the most computerized per capita in the nation, the program will determine whether or not a prototype system can be developed in one city and then transferred to another.

Another city participating in the project is Charlotte, N.C. Dunn said the city now has two computer

systems (IBM 360s), one for traffic control, the other for "housekeeping" chores. Speaking of his city's approach to government, Dunn said, "Computers have brought it out of the dark ages."

Wichita Falls claims that its traffic control system, installed in 1966, was the first in the country, and that it is now being copied by New York and Chicago.

Cost Savings

Dunn said an evaluation of the system, measured on a flow count of 90,000 vehicles daily, showed his city's motorists saved 19,500 hours of travel time and \$51,650 in operating costs a year.

The analysis also revealed a reduction in vehicle stops of 16.3% and a delay reduction of 31.1%. Traffic flow, Dunn reported, was speeded up in rush hour traffic from 20 mph to 30 mph, average. A second phase of the program to show results was the sanitation system on what Dunn referred to as the "housekeeping" computer.

On the Inside

GE Computer Seized
In Nonpayment Suit

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IBM Unveils 129 Card
Data Recorder System

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Air France's Alpha

The Air France seat reservation system, Alpha 3, just completed, and one of the largest of its kind in Europe, comprises three Univac 1108 computers, associated storage modules and communications units and video displays. Above is the control post and view of the telephone sales room.

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Drivers, Get Ready

CW Midwest Bureau

In Little Rock, Ark., the state Department of Revenue can't afford to get its bad drivers off the roads, but in Des Moines, Iowa, the first drivers' test in a national experimental system has become operational.

Over two years ago Little Rock announced it planned to accumulate a record of accident and traffic arrests on each of the state's drivers. The data would then have been used on a point system to reveal the "bad" drivers and either get them off the road or into some driver education courses.

"We don't have space available to store drivers' histories," said Ron Leneing, director of the driver's license division. He explained that the random access device had been saturated with data on drivers' licenses and cars and related information.

"The result is," he said, "that we would have to have a data cell for that purpose [driver records and accident records] alone."

In Des Moines, the \$127,000 pilot project, totally funded by federal money, is designed to meet a National Highway Safety Bureau (NHSB) decree that all applicants for drivers' licenses, renewal or not, take a written test. As yet, no date for national adoption has been set by the NHSB.

NHSB authorities agree that the computerized test, which takes about 37 minutes, would handle the deluge of examinees under the new requirements.

Computer compatibility, a hang-up we understand



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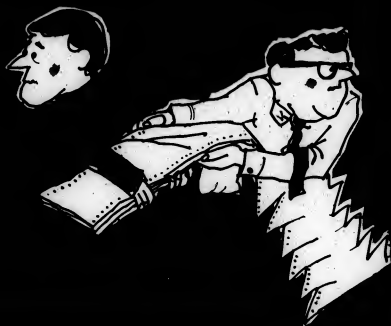
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Program Deficiency Cited

Detroit Tries to Explain 'Hole'

DETROIT—The fires of discontent started here by the last punched card vote foul-up are still smouldering, and if some politicians and voters alike had their way, the grumblings could flare up again.

The main cause of the 56-hour delay in obtaining the final vote count has been attributed, by most sources, to the now infamous "mystery hole" [CW, Nov. 11].

Some sources believe that the unexplained hole in the ballot card was caused by an improper fit of the card in the Votomatic machine.

The improper fit, CW was told, could have been caused by either of two factors. First, the spring in the machine intended to hold the card firmly did not allow the card to slip under it, thereby misplacing the ballot in the machine.

The other possible cause was that the pegs at the top of the Votomatic machine gave too much leeway to the ballot, allowing it to move up and down enough to misalign chads punched out by the voters.

One investigating reporter of a

Detroit newspaper told CW that he had placed a card in the demonstration machine at the election commission offices and had been able to punch out a chad, miss a chad completely, and punch out an incorrect chad

reject device built into the program to keep demonstration cards (not official ballots) from being accidentally included in the count.

Some sources feel that a program deficiency was another cause for the delay. According to this opinion, in the card-to-tape program in the general election each tape should have provided a printout of, at least, the precinct numbers of each of the precincts on the tape for labels. Two tapes were made simultaneously, one for the program and the other for backup.

A tape would hold a maximum of 36 precincts. Due to the program aborts of the precincts, the labels were not made and the operators had to make them by hand for both tapes from the console log, adding to the general work slowdown, the sources said. They added that this condition was prevalent at all three counting centers.

They also said that the program deficiency could have caused the operators to relob the vote count program, but would not state that they had seen that actually take place.

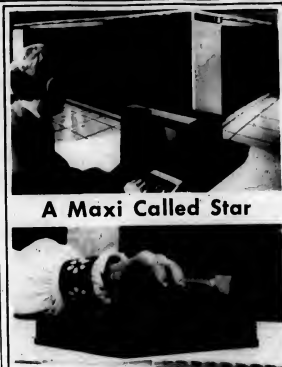
Et Tu, Carl?

DETROIT—Strange things happen in American politics, even in computerized elections. While Sandy Levin, Democratic candidate for governor of Michigan was biting his nails over the 56-hour delay which would determine the next governor of his state, some people were wondering if he remembered that his own brother, Carl, was one of the Detroit city councilmen who voted to reject the Votomatic system in Detroit after the August primary fiasco.

without taking the card out of the machine.

Ballots Reproduced

The "mystery hole" forced the counting center workers to reproduce most of the ballots since the hole coincided with a



A Maxi Called Star

And The Miniest of All

There are computers and there are **COMPUTERS**. The one on top, Control Data's long-awaited Star-100 (for String Array), can add about 100 million 32-bit floating-point numbers in a second. Bunker-Ramo's BR 1018 though a bit slower and less capacious, is a good deal smaller, in fact, the minicomputer packs a memory the size of a 1401's into a unit about as big as a telephone. The two new choices for systems analysts suggesting equipment configurations range in price from \$6.8 million—delivered, that is—for the Sret, to \$30,000 for the 1018, though Bunker-Ramo hopes to bring that price down to \$5,000-\$6,000 if it goes into mass production. CDC has no plans for mass producing the Star.

So if you need the CPU for a time-sharing system with 10,000 terminals, or if your center is a little cramped and you want to put your computer into a file drawer, your problems have been solved.

COMPUTERWORLD
The McGraw-Hill Information Group
1221 Ave. of the Americas, New York, N.Y. 10020

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EDITORIAL OFFICES, 757 Washington St., Newton, Mass. 02450 (617-332-2100, 2101-2133).
Chicago, 25 E. Chestnut St. 60611 (312-444-5885, TWX 910-0131).
Los Angeles, 1160 Wilshire Blvd. 90049 (213-352-6551).
New York, 1200 Avenue of the Americas, New York 10020-1 (212-512-2000).
San Francisco, 1000 Market St., S.F. 94102 (415-398-3300).
Washington, 1100 K St., N.W. 20004 (202-462-5830).
London, 1100 K St., N.W. 20004 (202-462-5830).
London, 1100 K St., N.W. 20004 (202-462-5830).
London, 1100 K St., N.W. 20004 (202-462-5830).

Second-class postage paid at Chicago, Ill. Published weekly (except for combined issues for the last week in December and first week in January) by Computerworld, 757 Washington St., Chicago, Ill. 60611. © 1970 by Computerworld, Inc.

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Postmaster: circulation manager, four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 757 Washington St., Newton, Mass. 02450.

WALTER BOYD, publication manager, PATRICK J. MCGOVERN, publisher.

1110 Is Univac's Largest

(Continued from Page 1)
speeds as high as 2,000 line/min.

Main storage on the 1110 is magnetic, non-destructive-read-out, plated wire expandable in 32Kword increments to 256K words. This storage has a read cycle of 320 nsec and a write cycle of 520 nsec, Univac said.

The 1110 also utilizes extended core storage, to 1,024K words. This storage has a cycle time of 1.5 µsec.

The CAU performs control, logical and arithmetic functions, and employs a four-deep instruction overlap. Each CAU has a short instruction cycle of 300 nsec.

The Univac 1110 is its minimum 2 by 1 configuration will report for approximately \$68,000 including maintenance. A 2 by 2 configuration rents for about \$29,000, and the large 4 by 4 system rents for about \$119,000. Purchase prices are \$2,610,000, \$3,045,000, and \$4,885,000, respectively. First deliveries are scheduled for November 1971.

The addition of the Univac 8440 disk subsystem adds to the disk pack storage capability of the 1110 series. The system can accommodate from one to eight drives, each with a capacity of 24 million words.

The controller is priced at \$275,500, and each drive leases for \$325/mo.

A high-speed printer, the Univac 0768, that is capable of printing both upper and lower case characters has also been added to the 1110 line. Print speed varies from 840, 132-char/line/min when the full set of 94 characters is used, to 2,000 line/min with a 14 character subset. The rental 'price is \$1,425/mo.

The third addition to the 1110 series is the Univac 0716, 1,000

card/min reader. It can read either 160 6-bit char/card in the image mode, or 51, 66, or 80 char/card in the translate mode. The unit will rent for \$360/mo.

The Univac 2000 magnetic tape subsystem can handle 1,600 bit/in. tapes at 200 in./sec. Standard 1/4-in. tape is used. The unit can record forward and backward.

Facilities Management Can Be Useful

(Continued from Page 1)

Facilities management, however, has a generally bright future. Even today, as a relatively new segment of the commercial data processing industry, it is spreading from small users in the \$10 million sales volume class to the largest corporations in the world, and to the huge number of organizations in between.

Progress won't be made, nevertheless, until the facility management community can agree on a definition of their services and on standards of performance, for their own guidance as well as for the users.

What Is It?

What is facilities management, anyway? The Association Data Processing Services Organization (Adapso), recognizing the need for an answer to this question and the need for standards, has formed a facilities management industry group, currently headed by Jack Mooney, president of International Computer Management Corp.

Eventually, the group can be looked to for a workable definition, but it doesn't have any yet.

Asking the companies and examining their literature doesn't help much either. For instance, Electronic Data Systems, the celebrated kingdom of

the business, describes its activity as "the intelligent use of computers," a spokesman denies that facilities management is its primary interest, although the firm was, effectively, responsible for the widespread use of the term today, he admits.

Another firm says total facilities management includes the operation of the customer's equipment and staff.

Still another, Cambridge Computer Corp., describes itself as "an organization of professional computer managers who assume complete responsibility for your entire data processing requirements. We call this service facility management. We professionalize design, install and operate your entire system. We manage the equipment, the people, the software. Plus, we provide guidance to your management."

That description comes closest to a meaningful definition. Further added is the over-simplified terminology offered by M. Scandell, president of Industry Computing Company, in an article in the March-April 1970 issue of IEEE Computer Group News. "Facilities management," he wrote, "is the practice of running computers for others."

It's more than that. Visualize a

service bureau which has a long-term contract with a client, and which provides the client with intensive management consulting services, including system analysis, design, programming, and implementation.

Long Period of Time

Facilities management companies provide, or seek to provide, users with these services over a long period of time, typically five years, on a more or less fixed fee per unit volume.

It is the integration of service bureau-type service and management consulting services which characterizes the facilities management company, along with the nature of its relationship with the user, which amounts more to an intimate marriage than a flirtation or engagement.

Of course, while marriage offers the greatest promise of fulfillment, it can also end in an emotional and pain-wracked divorce.

Malcolm L. Stiefel is an independent consultant with extensive experience in systems analysis, design, and evaluation. He is currently engaged in studies dealing with inventory control systems and municipal information systems.

POSTMASTER: Send form 3875 (Change of Address) to Computerworld, 757 Washington St., Newton, Mass. 02450.

Report Bares World Need for Trained DP Personnel

By Alan Drestell
CW Washington Bureau
WASHINGTON, D.C. — A worldwide problem continues to exist for trained data processing people.
This fact emerges from a report on the use of computers in local governments. The report, con-

ducted by the International Union of Local Authorities and covering replies from 15 countries including the U.S., was disclosed at the four-day International Conference on the Use of Computers by Local Government held here last week.
In addition to the U.S., other

nations included in the report were Austria, Czechoslovakia, Denmark, Finland, West Germany, Israel, Japan, Norway, The Netherlands, South Africa, Sweden, the UK and Yugoslavia. Turkey responded to the survey but indicated that no computers as yet have been introduced in local government administration.

A number of countries emphasized the need for orientation of courses on EDP application for senior management people.

In the U.S., most cities, according to the report, train equipment operators and keypunch operators themselves. Other types of professional supervisory and managerial employees are most frequently trained by the equipment manufacturers.

The survey, as expected,

showed that the U.S. had the most computers used in local government. Of the 47% of the cities with over 5,000 inhabitants responding to the U.S. segment of the survey, there were 300 computers installed or on order as of Jan. 1, 1970. The UK was second with 252, followed by Japan with 199 and West Germany with 117.

The survey also delineated joint use of computers between local government units, local government units and industrial enterprises, and between local governments and national bodies.

Regarding future use of computers by municipalities, Japan indicated that a wide application of EDP is foreseen in the years to come. The possibility of a data bank in each prefecture

(district) linked via terminals to the smaller municipalities in the area is mentioned. In addition, a plan for the joint use of medium-sized computers on a regional basis is now under study.

The U.S., according to Rodrick O. Symmes, director, Data Systems Development, Department of Housing and Urban Development, is sponsoring a prototype R & D program with six cities aimed at improving their general ability to manage information effectively.

The Integrated Municipal Information Systems (Imis) program is an experiment to learn whether prototype urban information systems can be successfully developed and operated and then be transferred to local jurisdictions elsewhere with a minimum of alteration.

Crime to Get Double Dose From Illinois Enforcement

SPRINGFIELD, ILL. — More than 200 local police jurisdictions will have their computing power doubled shortly when the Illinois Department of Law Enforcement installs its second IBM 360/50.

The presently installed Model 50 is used for standard police operations, such as identifying stolen vehicles, wanted persons, and stolen property.

The Law Enforcement Agencies Data System (Leads) has used computers successfully for a year-and-a-half, and the new computer will provide backup and will handle routine administrative work for the department.

Director, Herbert D. Brown noted advance information will prevent detention of innocent persons, but will prepare police officers to "deal effectively with criminals."

Brown cited recent successes of the Leads system: in one case, a car stolen in Great Lakes was recovered by Wisconsin authorities nine minutes after the theft was recorded.

"In another," Brown related, "construction equipment stolen in Pontiac was recovered in Cal-

ifornia a few days later — about as long as it took the thief to transport it there."

Originally developed for use on the smaller 360/40 in 1969, the Leads system was adapted to the first Model 50 in June.

Computer Used As Recruiting Aid For Coaches

PASADENA, Calif. — Put a computer in the middle and collect from both ends, and what do you have? "Athletes 70," a package devised to tell coaches about players, with both input and output paying the tab.

A firm known as Group 5, Inc. inaugurated the program in September. Prospective college athletes pay \$10 to get into the data bank, which is used by the coaches as an aid to recruiting.

The coaches pay \$25 for a monthly report from Athletes 70, and for their cash they get a computer of participants in the 13 western states, plus the "right" to buy one player's, or many players' individual records at 55 apiece.

Group 5 leases computer time to collect and store the information, and estimates it will take 750 minutes and 175 institutions in order for the program to pay for itself.

A 50% discount is available for the athletes in their second or third year of participation. The title of the publication, and the system itself, advances with the years, so that next year's system will be called "Athletes 71," and so forth.

Only football and basketball are used now, but plans call for expanding to all sports.

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you should have
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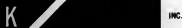
The Friendly Certified Cassette Store — K/TRONIC — is the place to go for computer cassettes. After all, your computer system cost a lot of dough, and you'd never think of fixing it yourself if it went down. But when a computer cassette goes out, you think you can solve the problem yourself. Because cassettes are just a buck ninety-eight each at The Friendly Record Store. And a cassette's a cassette. Right?

Wrong. Record stores sell great audio cassettes. Perfect for preserving scratchy old Glenn Miller records or recording the

Nitty Gritty Dirt Band. But bad news when you ask an audio cassette to play a tune called inventory control or to feed a big computer when a single missing "1" can blow the whole system. Computers use digital, not audio, tape, though both are packaged in cassettes. This is where K/TRONIC comes in. K/TRONIC sells only certified computer-grade tape that is precisely slit with no rippled edges. Output is uniform, resolution and response excellent. Tape surface is smooth, free from glitter trash, airborne contamination or error-

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For most users, K/TRONIC certified digital tape cassettes cost \$4 to \$6 each. Delivery is off-the-shelf. So don't buy a new set of problems from the record shop. Write or call, describing your computer application, and buy life insurance for your system from K/TRONIC, the Friendly Certified Cassettes Store.

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'Referee' May Solve DP Hierarchy Struggle in N.H.

By Edward J. Bried
CW Staff Writer

CONCORD, N.H. — An external referee is expected to make recommendations this week to try and settle a "petty data processing hassle" in the state hierarchy. New Hampshire newspapers have editorialized that "internal squabbling ... and politicking" in this "hassle" have delayed centralization measures passed in the special session of the legislature last spring.

Under the statute, which became effective July 1, DP Director Richard Hawes was to provide guidance, consultation, and regulation for all state computers, which means two, plus five EAM sites, plus two colleges which Hawes hopes will eventually be declared "ex-empt" from the law.

The Boston consulting firm of Arthur D. Little (ADL) was called in to determine an effective implementation plan when one of the two state departments

with computers — Data Processing has none — could not agree with Hawes on who could exercise authority under the law. Hawes' attempted utilization of the computer at the Department of Public Works and Highway (DPWH) brought internal criticism of the "organization" created by the 1970 statute.

The state's Executive Council, among other critics, disapproved of Hawes going outside his department for computer work, despite the fact that the legislation had specifically authorized him to do so. So the \$10,000 study was paid out of the budgets of the two departments. Centralized Data Processing and DPWH, each contributing \$4,500, with the Senate Finance Committee picking up the balance.

The consulting firm was expected to report earlier this week to the finance committee, which authorized the study, and then to release a formal, written

summary before Thanksgiving.

Richard Pucci, manager of the DPWH computer center, said he would "prefer not to discuss" the problem until release of the ADL decision. He did acknowledge the existence of differences between the two departments, but declined further comment.

DPWH Commissioner Robert H. Whitaker also declined comment, noting it was an "inopportune time" to discuss the situation, since the study was still under way. Currently, DPWH has an RCA Spectra 70/45 running on two shifts, one of which could be eliminated, Hawes said, with some revamping of scheduling procedures.

The other computerized state department — Employment Security — utilizes an IBM 360/40.

The original centralization law, passed in 1967, was "weak and vague," according to Hawes, who was hired as DP director two years ago. A citizens' task

force then recommended strengthening the law, and the 1970 special session passed this stronger version in April. In the meantime, Hawes was establishing a budget, a work force, and a plan which, since the bickering has delayed implementation, could be wiped out after the ADL study.

Consolidation Tasks

Hawes said he is not so concerned about which plan is adopted, but just wants to get on with the tasks of consolidation.

Politicians and newspapers are critical of the \$10,000 ADL study, since they claim, Gov. Walter Peterson should have forced strict enforcement of the law before the differences reached the "controversial" stages.

Hawes, the first director of the centralized DP department, noted that the time for consolidation is at the beginning, and said he hoped the ADL study would quicken the controversy.



Special tours arranged by Afips during this week's Fall Joint Computer Conference include a trip to the Manned Spacecraft Center at NASA's Houston facility. According to Afips, "special emphasis" on the tour will be given to the center's computer capability, a small portion of which is viewed here.

WE HOPE FJCC WILL BE INFORMATIVE FOR YOU...



BUT DICOM WANTS TO PLAY THE GAME ON YOUR GROUND UNDER YOUR RULES.

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We'll be glad to demonstrate the Cassette Magnetic Tape Operating System which...

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To give your minicomputer the system capabilities and efficiencies of multitransport mag tape, call (collect) or write Diacom for more information or a demonstration.

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(408) 732-1060

Early Response for SJCC Space Gives Rise to Afips Optimism

(Continued from Page 1)

attendance figures are expected to drop. In fact, non-exhibitor personnel dropped from 1968 to 1969 in the fall show and '69 to '70 in the spring meeting. (Afips generally uses this comparative method, since the meetings are held in opposite ends of the country.)

The negative trend in attendance, plus the exhibitor situation, does not augur well for industry in general, although any upturn in attendance could be a sign of a significant change for the economy.

Meanwhile, all plans have proceeded as if things were booming. On the surface, at least, Afips reported increased interest in its "extracurricular" activities like the Texas-style barbecue, and the luncheon.

... And Society

The social implications groups of ACM and IEEE, filling the void left by the omission of special sessions in the official program, have scheduled an evening meeting on "Computers and Society." A week after ACM announced the meeting, Afips agreed that it, too, was indeed a co-sponsor.

The meeting is planned for tonight, [Wednesday], 8 to midnight. All speakers involved in the FJCC technical program have been invited to sit at a panel, to field questions from attendees.

In the final days of preparations, Afips said it might move the meeting to a larger room than originally planned, because it is the only session dealing with the latter part of the conference theme, "Systems and Society."

Computer People for Peace (CPP), announced it was "extremely disappointed" it hadn't been "invited" to participate. Afips was quick to respond that all

interested people were eligible to submit papers, and that all ACM members had received individual notice of the "call for papers." Several CPP members also belong to ACM.

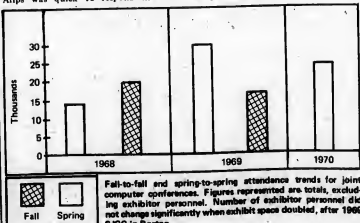
H.G. Amus, executive secretary of Afips, stated that "not one member" of CPP had responded to the call. Dr. H.R.J. Groosh once explained the "social implications" sessions as "everyone sitting up there, wringing our hands in union." Groosh, himself a CPP member, was on the particular panel which he described. CPP may have something different to offer next spring. Paul L. Millstein, of CPP's SJCC planning group, said his committee is working on a program for the spring conference. To include such subjects as: The Social Responsibility of Computer Workers and Users, The Role of the Computer in Society, and Job Security and Mobility of the Computer Workforce.

Show officials said there hadn't been much input as to what particular equipment would be on display, although they did state there seemed to be a trend toward orienting exhibits to original equipment manufacturers, as opposed to end users.

Of the large exhibits, at East Control Data, Britale's ICL, and part of IBM's booths are slanted towards OEMs.

In announcing plans to exhibit two new dedicated computers, an IBM spokesman called Houston the "hotbed" of the process control/data acquisition market, especially considering the petroleum and research areas.

Houston ranks first nationally in the manufacture and distribution of petroleum equipment, and is the nation's leading refinery center.



**IBM
announces
eight new ways
it's the company
behind
the computer:**

Two new four-

IBM's new System/7.

It's a laboratory computer, a process control computer, a plant automation computer, a data acquisition computer.

It brings a new world of sensor-based information to your information system.

If you're a scientist, you can use IBM's System/7 to monitor and analyze readings coming in from laboratory instruments.

If you're an engineer in a process industry, you can use it to keep the correct measure of ingredients flowing into a paint formula, or control the thickness of paper in a paper mill.

If you're a manufacturer, you can use it to monitor

the number and quality of pieces coming off an assembly line.

If you're in any number of businesses, you can use IBM's System/7 to gather *sensor-based data* directly from your working environment. And make it a normal part of your data base.

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IBM's System/7, with advanced technology, *monolithic logic and memory*, can operate on its own. Or become an integral part of your information system. Because it easily ties into System/360, or System/370, or the 1800, or the 1130.

It's four more ways we're the company behind the computer.



IBM System/7 as a process control computer.



IBM System/7 as a plant automation computer.



IBM System/7 as a laboratory computer.



IBM System/7 as a data acquisition computer.

way computers.

IBM's new System/3 Model 6.
It's a small business computer, a ledger card computer, a problem-solving computer, a computer terminal.

Here is the most versatile small computer we have ever made.

If you're a small businessman, you can use it to get out the payroll, the bills, the inventory reports.

If you want to keep using ledger cards, you can get an advanced printer to handle them.

If you're an engineer or a banker or a statistician, you can use it to solve problems. Like determining the flow of water through a 6-inch pipe. Or the flow of cash through a multi-million dollar company.

If you're with a large company, you can use it as a terminal hooked up to System/360, System/370, or another System/3.

You can key information directly into Model 6. And store it on disk files. And process it at up to 100,000 calculations a second.

The low-cost System/3 Model 6, using advanced monolithic circuitry, is compact and self-contained.

It's four more ways we're the company behind the computer.

IBM.

The company behind the computer.



IBM System/3 Model 6 as a computer terminal.



IBM System/3 Model 6 as a problem-solving computer.



IBM System/3 Model 6 as a small business computer.



IBM System/3 Model 6 as a ledger card computer.

Editorial

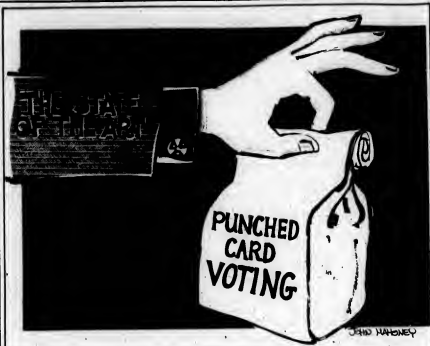
Moon Shots and Garbage

"We can go to the moon, but we can't even handle our garbage problems here on earth," is a favorite saying of a number of people.

And there probably is some question about our priorities.

But that doesn't mean nothing is being done on earth. In Wichita Falls [see Page 1] and other municipalities, computers are unscrambling traffic, improving garbage collection, and tackling dozens of other bothersome human problems.

So the next time someone badmouths computers, tell him about the computer that is reducing traffic delays by 31%.



Letters to the Editor

IRS Agents Said to Misuse Data

Your editorial page of Oct. 28 concerning misuses of the FBI's NCIC rap files by dishonest cops neglects another aspect of the problem which is much more important.

I refer to the improper use of data from the NCIC by government agents in the performance of their duties.

The habit of IRS agents, engaged in tax audits, of dropping hints around town that the object of a given audit is under suspicion of tax evasion is well documented.

Where they used to say to bankers, suppliers and others: "So and so is under investigation for tax fraud—maybe his credit won't be so good in the future"—it's not hard to see them adding, after reference to the NCIC: "And did you know that he has a criminal record?" (He, with 50 others, was once suspected of locker theft in high school.)

Unlike a situation involving a dishonest cop, the victim of this kind of procedure has no recourse whatsoever since the damage was done by an agent of the government in the performance of his duty.

Hoover's protestations to the contrary notwithstanding, this kind of thing does happen and will most certainly continue in the future.

R.W. Pratt

Salt Lake City, Utah

DUA Not Part of Digitronics

I want to thank you for a fine report on the 5th Annual Digitronics Users Association Conference recently held in Chicago [CW, Oct. 28].

While your reference to me as "DUA President" is flattering, I would appreciate your noting that the DUA is independent of Digitronics.

The president at the conference was Charles J. Polving who is with the American Cyanamid Co., and my comments were made as president of Digitronics.

Clifton W. Sink
President

Digitronics Corp.
Albertson, N.Y.

Guides Needed to Nuth Sabotage

In reference to the article "Best Data Center Sabotage Plan Wins" [CW, Oct. 14] by Edward J. Bride, I can see no reason for making a public show of how easy it would be for some misguided or disgruntled individual, to completely destroy a company's online data files.

I think data processing management as a whole is aware of what easy targets we are and it would

therefore seem to me that a comprehensive study, with guidelines for prevention of various and sundry sabotage methods would be more in order.

As for Pope's statement, "there was a lack of communication which could be intensified by the lack of human intervention," it might be well to observe that it was probably the human intervention communication link which failed.

By this I mean that it was probably some clerk who failed to notify some other clerk who failed to fill in or submit the required documentation to those in authority to correct errors or problems of this nature.

In the not-too-distant future, direct communications with the computer will eliminate many of the human communication links and thereby eliminate many of the inherent problems therein.

Charles W. Frank, Jr.
Data Processing Manager

Dunham-Bush, Inc.
Harrisburg, Va.

Some Suggestions for RBPE

Your Oct. 21 and 28, 1970, issues contained articles describing certain persons' opinions of alleged deficiencies in the Registered Business Programmer Examination recently sponsored by the DPMA.

The only question of real importance to be answered about the RBPE is: does it measure what it purports to measure, i.e., does it discriminate between good business programmers and poor business programmers (or non-programmers) to a statistically significant degree?

The development, and more importantly, the validation of examinations such as the RBPE should be undertaken only with the technical consultation of a professional psychologist who has had long and successful experience in test construction and validation.

I hope this is what DPMA Executive Director R. Calvin Elliott meant when he told your reporter that the examination had been "proofed" by an outside company.

Philadelphia, Pa.

Computerworld welcomes comments from its readers. Preference will be given to letters of 250 words or less. Computerworld reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington Street, Newton, Mass. 02160.

B.E. Crumrine

'Good Guy' EDP School Enforces a Strict Code

WASHINGTON, D.C. — Among the private EDP schools there are the "good guys" and the "bad guys."

And the bad guys, according to Eugene Axelrod, vice-president of Computer Learning and Systems Corp., which operates schools in suburban Maryland and Northern Virginia and in Los Angeles, are not as numerous today as they once were. The reason, he says, is that the public is becoming increasingly aware of just who the "fly-by-nighters" are.

Unfortunately, there are still some bad

g u y s

around, and Axelrod would have to attest to that.

Less than a year ago Computer Learning stepped in

and took over the training of

students

stranded when the school they were attending in the Washington area went out of business [CW, April 29].

The Federal Government has also recognized that a number of bad guys still abound. On Tuesday, Dec. 1, the Federal Trade Commission will hold hearings on proposed guidelines for private vocational and home study schools.

Axelrod is anxious to dispel the cloud that has hovered over the private EDP school industry almost since its inception.

He stresses the need for more accreditation by independent agencies, such as the National Association of Trade and Technical Schools which has approved Computer Learning's activities. He added that policing of schools can be done most effectively by such organizations.

There is, of course, value in accrediting, but it is dubious that an accrediting organization that does not specialize in the very specific milieu of computers can effectively approve and then keep tabs on EDP schools.

Common Rules Lacking

Computer Learning trains close to 1,300 students a year in its three facilities. In several areas where complaints against private EDP schools have been prevalent, Computer Learning is quite explicit about "do's and don'ts."

For example, many of the bad guys have blatantly misled prospective students through advertising. Computer Learning, on the other hand, has a list of nine "no's" that forms a code for ethical ads: no promises of success, no promises of finding a job, no use of salary figures, no superlatives, no implications that graduates are working at certain companies, no implication that the school is an "IBM" school, and no use of scholarships as a marketing tool.

The course objectives, according to Axelrod, are straightforward. "We offer three programs designed to prepare graduates for entry level positions in the area of computer programming, operations and electronics."

Students are required to write a specified number of programs in each language taught. A minimum of five is required for Cobol and ALC, and three for Fortran IV and PL/I.

The teaching staff averages over four years' DP experience. A 360 system with tape and disk is on site at each school.

The company also maintains a placement service, and in the first four months of this year placed 90% to 95% of its graduates, according to Axelrod. The overall placement average for the year, however, is 65% — partly because of the current poor job market.

D.C. Data-Line

By

Alan Drattell



Failure to Consider Others

System Designer Is Guilty of the Sin of Arrogance

The comments in the California Senate [CW, Taylor Report, Nov. 11] about the failures in data processing were pegged, quite naturally, on the vote fiasco. Politics is the art of the practical, and knows the need to pick up political support.

The Taylor Report By Alan Taylor, CDP



The voting operation has certainly been one of the worst applications I follow-through that we have seen so far, although I am far from convinced that it would not be quite mild when compared with other failures that simply have not become public knowledge. But, everything considered does not explain the current grass-roots objection to computers. Listening, as I try to, to people's comments about computers, I hear a definite hardness of thought, which does not bode well for any real understanding in the future. The computer, in the public mind, appears to have been polarized.

Two Arrogant Bills

And I am not particularly sur-

prised. I find that the interface with computer applications is often quite unnecessarily harsh, and simply does not appear to take into consideration the outside world.

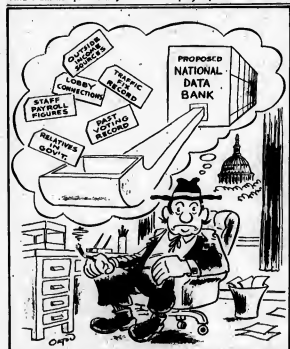
For instance, while writing this article, I checked my "in"-tray and found two computer-based bills, one from my Master Charge credit card company, and one from Blue Cross-Blue Shield. Both of them show a startling failure to think of other people — and people notice when they are being ignored.

The credit card people provided me with a printed envelope into which I put the billing card, and which I then metered. The result is shown in Figure 1.

You can see that the computer originated address has been placed right at the top of the envelope, just where the postmark goes. Nor was this the only risk that the address had to survive if it was to look at all normal. The printed lines fell right on punched rows! The address on my card happened to survive — but other cards from this system that I have seen have had the name of the bank punched out before the card ever left the computer room!

Ignoring Proper Addressing

The proper place for an address



"Indeed, many congressmen share a deep sense of uneasiness about this equipment which can retain and reuse almost any bit of information." [News Item]

Need Fast Turn Around?

Are you still waiting for that special report because your computer is bogged down and overburdened with routine work? Well, you can do something about it. Our staff has been turning out finished programs — and that means 100% debugged and fully documented — for large corporate clients within days after receiving the program specs. We will pick up, code, debug, run and deliver your job. So, contact our v.p. in charge of systems and ask for a free cost estimate. Find out how we can help you beat that tight budget and get the job done on time.

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212-246-2529

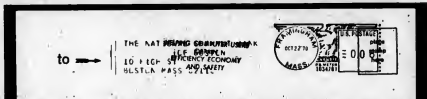


Figure 1. View of address of Master Charge return envelope. Note incorrect placing of address, making it liable to being overwritten by properly placed postmarks, and positioning of punch rows which can delete part of the printed address.

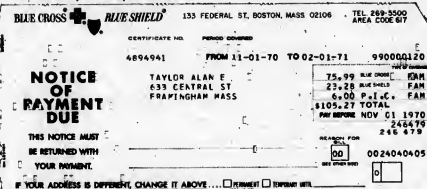


Figure 2. Blue Cross-Blue Shield invoice. Note the demand for the return of the invoice, and the number of unidentified numbers on the right.

is in the center of an envelope and not at the top. The proper style of an address is clear and complete — not obscured and mislaid!

But these things actually do not weigh with the arrogant designers of the Master Charge billing system. And every postman who has to deliver one of the silly envelopes, and who sends a payment in will feel he is having to adjust to the convenience of the computer, which thinks that it is above bothering about doing even a simple job in the standard manner.

That then is another case where people are being taught that computers are arrogant, and people are learning to believe it.

Blue Cross-Blue Shield

Figure 2 shows the front of the other bill I happened to receive. Here you will see the blunt notice "This Notice Must Be Returned With Your Payment!"

In the illustration this does not stand out, but in fact it is printed in flaming red, unlike any of the surrounding materials. The card, however, is the only record of just what the

payment is for — in fact, a notice in with the bill happily says that the amounts shown have been prorated as a result of some changes so that the amounts cannot be tied backward or forward!

As far as I am concerned, when someone bills me for something he is entitled to my money — but I am entitled to an accounting for it. The fact that some arrogant computer system designer wants to have cheap input should not affect that at all. The use of single copy bills with a demand for their complete return is arrogant and quite uncalled for.

But in this case an interesting comment on the back of the card caught my attention.

It says: "Please put your certificate number on the front of your check or money order." Now, I normally place the invoice number on my checks, but this silly system does not identify any particular number as an invoice number. If you look at Figure 2 you can see three unidentified numbers (990000120, 246479, and 00240242405) any one of which could be the item — but really the certificate number is the way that the account is identified.

But, if the certificate number is adequate to identify the account then why do we really have to return that card?

Return Not Necessary

So I rang Blue Cross, and found that I did not have to return the card! Just put the certificate number on the check, and everything would be fine.

This raised an interesting point. The system, in only providing a single copy of the bill, and demanding it back, was arrogant. Does the fact that the demand was also inaccurate make matters better, or worse?

I'd like to hear your opinions on that — and also to hear of any other examples of arrogant systems of which you know. These have got to be stopped before we will get any real improvement in our relations with the outside world.

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COMPUTER MEMORY REPAIR

BREAKS SHORTS ETC

FAST EXPERIENCED

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New York Metro Area publicly-owned, adequately-financed computer service

bureau with 360/30 65K seeks merger or joint venture with similar EDP company.

Object: hardware and personnel economies.

Principals only.

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The Cosmair, Inc. hair and skin analysis program drew several interested patrons to the Courier Executerm II terminal.

Computer Hair, Skin Analysis Possible With Display Terminal, Printer, Basic

NEW YORK — During the recent Beauty Week at Macy's in Herald Square, Cosmair, Inc., exclusive licensee of L'Oreal of Paris, presented a free computer hair and skin analysis at the L'Oreal counter.

The analysis used a Courier Executerm II video display terminal with an Execuprint I printer attachment; the terminal was connected to a SBC System 360 with an Anderson-Jacobson coupler. The program was written

ten in Basic by Cosmair DP personnel.

Based on the input data appropriate information was drawn from the program and shown simultaneously on the video terminal and printer. The printed output was given to each patron.

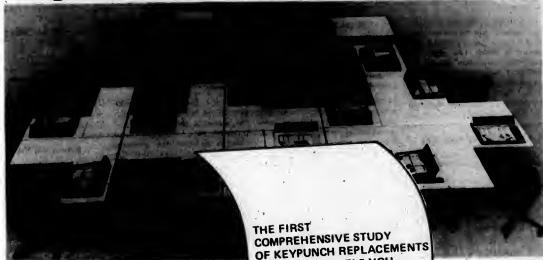
In order to capture the data, each patron was asked to check appropriate answer boxes on preprinted cards containing 19 questions. The answers to these questions, as well as the patron's

name, were entered through the keyboard. The three paragraph response printed out in approximately 3-1/2 to 4 minutes each. The program required approximately 12,000 bytes of core storage.

The only problem experienced was early in the week when one of the switchboard operators listened in and upon hearing a funny noise on the line, disconnected the call and asked her supervisor to make a repair call to the telephone company.

a Computerworld reference for data processing management

Keypunch Replacement Handbook



THE FIRST
COMPREHENSIVE STUDY
OF KEYPUNCH REPLACEMENTS
ORIENTED TO HELP YOU
SELECT THE RIGHT
EQUIPMENT TO REDUCE
KEYPUNCH PROBLEMS

KEYPUNCH REPLACEMENT HANDBOOK is your guide to saving money and increasing efficiency through successful elimination of keypunches at your installation.

This authoritative work has been prepared by Edward White, Spencer Marlow, and Dr. Lionel Miller, authors who combine over twenty-five years of experience in aiding computer users through increased efficiency of data entry.

KEYPUNCH REPLACEMENT HANDBOOK includes:

- A survey and analysis of the characteristics of keypunch replacement equipment
- Checklists to identify the features you need
- Worksheets to calculate the cost savings likely
- A guide to acceptance tests and operator training
- Detailed case histories on both successful and unsuccessful keypunch replacement experiences

KEYPUNCH REPLACEMENT HANDBOOK will be ready for publication in January, 1971. Save money by entering your order now at the prepublication price of \$75 (a \$20 saving over the regular price of \$95). To order, simply send in the form below. We will bill you after we ship the book. This special prepublication offer expires November 30, 1970.

Please enter my order for _____ copies of **KEYPUNCH REPLACEMENT HANDBOOK** at the special prepublication price of \$75* per copy (postpublication price is \$95). We will bill you after we ship the book.

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*Prepublication offer expires November 30, 1970.

Mail to: Computerworld, Dept. KRH, 797 Washington St., Newton, Mass. 02160

Report Suggests Ways to Improve Case Scheduling

SAN BERNARDINO, Calif. —

Recommendations for improvements in witness utilization and case scheduling in the San Bernardino County Municipal Court have been outlined in a consultant's report.

The study project is one of the first of its kind to be sponsored jointly by a municipal court, district attorney's office and police department, under a grant from the California Council on Criminal Justice.

The study, performed by Isaacs Associates, Inc., a Los Angeles-based firm, collected information directly from courtroom observations by researchers as well as police witnesses.

The results showed that substantial witness and court time is being lost due to a variety of causes, including unavailability of counsel, inadequate communications and information handling, and case scheduling approaches that are not totally consistent with differences in case length.

The study project was first formulated in March 1969.

The report recommended a four-point action program to improve operations in the court.

Herbert H. Isaacs, the principal consultant, indicated that the first step has already been taken. A multi-agency coordinating committee to facilitate the recommended changes has been appointed by the Council of Presiding Judges for the five-location municipal court district.

The three other major recommendations of the study include a test program to evaluate the recommended case scheduling approaches; the seeking of additional defender and district attorney resources; and the implementation of a computer information and communications system for the courts.

ADVERTISEMENTS FOR BIDS

Sealed bids will be received by the Chico Unified School District, 1183 East Seventh Street, Chico, California 95926, until 10:00 A.M. Monday, November 30, 1970 for the following Data Processing Equipment:

BID NO. 1 — 1401 AK Computer System

BID NO. 2 — Unit Recorder

Equipment, 026, 083, 014 and 048

Detailed bid specifications may be obtained from the Business Office, Chico Unified School District.

The Chico Unified School District reserves the right to reject any and all bids and proposals.

Scandinavia's 1st Data Theft Occurs at Service Bureau

By CW European Bureau
HELSINGBORG, Sweden - Scandinavia's first theft of data came to light in the past month.

Two employees of the Tretan Data Centre, a service bureau which specializes in gathering and holding on file information from the population registry to sell in selected list form, borrowed the tapes and copied the more saleable data on a computer in Stockholm, and sold them at a reduced price to their own customers.

Among the buyers was a private statistics office and a political party which purchased a tape containing details of 210,000 primary electors.

The theft was discovered when some tapes were found to be missing prior to a special run.

Subsequently, the two employees were discovered, tried, found guilty and sentenced to six months' imprisonment.

ITT Dataservice Sued - Late Payroll Gets Strike

COPENHAGEN - ITT Dataservice Denmark is being sued by a local building contractor for a delay in the preparation of the company's payroll. The delay in giving the contractor employees their wages caused a strike in the firm and the firm is now claiming damages for losses incurred during the strike.

Many bureaus in Scandinavia are closely watching the outcome of this case, for if the judgment goes against ITT there is a feeling that service bureaus will have to alter their terms of business to indemnify themselves against similar proceedings.

Visiting Businessmen To Ask for Firm Profiles

LONDON - Before the end of the year, Mafco Ltd. will be using an NCR Century 100 computer to help provide foreign businessmen with a tight, selective list of UK manufacturers with whom they could well seek to trade.

As an indication of export or import potential, over 300,000 businessmen are invited in Britain by Boac and BEA (the UK's state airlines) flights alone last year and the figure is expected to rise.

Interfile Data Services Ltd., a new company set up with the blessing and active support of both BEA and Boac, has placed Mafco Ltd. under contract.

At first, the new system will augment an NCR 500 computer already installed. Then, in about six months' time, the NCR Century will take over the NCR 500 workload.

The requests for lists can be processed by Boac and BEA for travellers at any of their overseas offices. The inquirer will be able to have the list sent to his home or office before he starts his journey, or waiting him at his UK address if preferred. Held in the NCR Century computer's files will be 30 words written by the company itself about itself, in addition to a description of its products, specialties and trademarks, turnover, nearest airport or station, and name of its export director. Altogether that's about 1,500 characters of information per company, and a weekly update ensures the information is current.

Computer Processed News May Require Car Radios

PARIS - The possibility that car radios may one day be compulsory in France, so that drivers can receive computer-processed traffic news, is envisaged by the French Government in a written parliamentary reply.

Secretary of State Jacques Baumel said traffic information given out over the radio was not enough, and that a continuous national plan with regional treatment should be set up.

Data collection and processing centers would be needed together with a particular radio frequency allocated to the service.

Baumel said only 30% to 35% of French

European Wrapup

cars had radios and it was perhaps necessary to make them compulsory (at vehicle factory level).

Baumel was replying after a weekend in which bumper-to-bumper traffic up to 40 miles long developed on French roads.

Soviet Aerofoil Switching To American Style

MOSCOW - Increased use of computer systems for maintenance control and seat booking is planned by the Soviet Aerofoil airline, according to Aviation Minister Boris Bugayev.

He said that planes were spending too much time in maintenance, and that there

was lack of liaison between different levels of staff.

Not only does Aerofoil provide an extensive internal service, but it serves nearly 60 countries at present.

Exhaust Control Tester Designed for Carburetors

LONDON - Testing of carburetors for Ford cars that must meet U.S. and European exhaust-emission regulations will be controlled by a \$384,000 on-line computer system from GEC-Elliott Process Automations Ltd., part of GEC-Elliott Automation, of the UK.

Ordered by Autolite Motor Products Ltd., a Ford company, last year the CON/PAC 4020 process computer is already installed at the Belfast, Northern Ireland, plant where eight carburetor test stands will be controlled initially.

At Belfast, each carburetor will be checked automatically under computer control throughout its performance

range, with either "pass" or "reject" shown at the end of every test.

During the operational testing cycle, adjustments to the carburetor are made by stepping motors under direct digital control from the CON/PAC computer which has a 24K core store backed by a one million word disk memory.

In addition to digital input and output facilities, a 64-point analog scanner is provided capable of checking the status of the plant at speeds of up to 3,000 points/sec.

Sweepstakes to Use 115

DUBLIN, Eire - The organization that runs the Irish Hospitals Sweepstakes, Hospitals Trust (1940) Ltd., will install Honeywell's latest computer - a Model 115 in the Series 200 range of business computers - in December. The computer will have 24K characters of main memory, one 9.2 million-character disk drive, three magnetic tape units, a card reader and line printer.

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Between you and an IBM is an RCA computer

The reason most people have to move to a bigger computer is that their workload outgrows their computer's memory.

To get more memory from IBM, you have to go all the way to a processor that's much bigger, more powerful, and more expensive than you may need.

RCA's new family of computers is designed with a proper balance between memories and processors.

RCA 2. RCA 3. RCA 6. RCA 7.

So, when you outgrow your 360/30, 40 or 50, you can make a smooth, logical step to the RCA system in the size you need.

Instead of being forced to jump to an IBM computer that's too big.

Why pay for power you don't need?

Here's an example. Say you have a 360/30 with the maximum memory size (65K) and you've outgrown it.

IBM would like to move you up to the 370/145. With a memory not even double yours (114K). But the processor is eight times as powerful as yours.

Do you need eight times the power?

We don't believe you do. Between the 360/30 and the 370/145 is an RCA computer that just fits.

The RCA 2. It doubles your present memory and more than triples your present power—the right amount of both. And it's \$41,000 a year less than the 370/145.

You do have one other choice, of course—the 360/40.

But it's not a new computer, and it's a big jump



up in price. The RCA 2 has half again the power of a 360/40 and costs \$15,000 a year less.

Bigger real memory. Unlimited virtual memory. More memory for less money.

Balancing memories with processors sensibly isn't the only way we work things to fit you.

Virtual memory is even more dramatic.

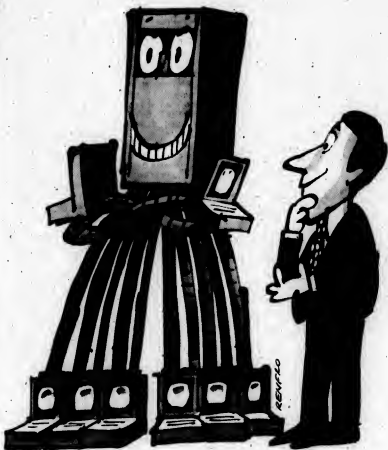
Virtual memory makes a computer work as though its main memory were unlimited in size.

Which means it's hard to outgrow.

And talk about a computer that just fits.

An RCA computer with virtual memory can do the work of a larger IBM computer with real memory.

computer that's too big, that just fits.



The only new computers that have virtual memory are RCA 3 and RCA 7.

360 Mode of Operation and Guaranteed Conversion cut risk.

We don't want you all excited by our new computers, but scared of switching.

So each of our new computers can include 360 Mode of Operation. It runs most DOS programs, to protect your software investment.

And, for 360/30, 40 and 50 DOS users who qualify, we'll switch you over. And guarantee results.

We'll convert your present applications for an agreed fee, by an agreed date.

The guarantee provides for penalty payments by RCA if we don't perform, and other appropriate provisions to protect both parties.

Only RCA offers you Guaranteed Conversion.

RCA is also the only major computer maker to let you choose how you pay for systems support—either bundled or unbundled.

IBM can only offer you computers unbundled, and it's costing a lot of companies a lot more money than they expected.

Also exclusive is our new Flexible Accrued Equity Plan. You pay up to 15% less than standard equipment rentals, and own the computer after 72 months.

Three unique policies that make it easy for you to get what you want.

Three weeks after announcing our new computers, we'd sold 2½ times our 1970 forecast.

And 75% of our new customers are IBM users. Maybe it's because our new computers are the only ones with what IBM users asked for.

The right size. The right price. The right service. Making them not just a step up, but the right step up.

We're out to win you over. And we only win when you win.

RCA
COMPUTERS

Seaside Scoring

HUNTINGTON BEACH, Calif. — "Beach terminal" in this case does not mean a place where people get off the bus and go swimming.

It means a standard Model 33 Teletype installed on a pier overlooking the recent surfing championships, and it was installed as a part of the sophisticated scoring system used to keep track of the contestants.

General Electric's Mark II time-sharing service provided the computer time from the company's nearby Ingleside installation, and all reports indicated unqualified success for the third straight year.

Judges in the U.S. Surfboard Championships wrote their evaluations at the end of each heat, and runners brought the results to the terminal, for transmission to the Mark II center.

Heat results, standings, and other pertinent information were relayed back, almost instantly.

Computer Seized in GE Nonpayment Suit

By a CW Staff Writer
NEW ORLEANS — A U.S. marshal has seized the computer of a GE customer in a dispute over maintenance, configuration, and software, after negotiations on an expired contract breakdown.

General Electric sought the action in a suit which also seeks to collect \$83,000 which GE said is owed by Interstate Computing Inc. (ICI) of New Orleans.

The figure represents two months' back rent of \$28,000 and over \$33,000 in unscheduled maintenance payments, plus interest and other costs.

The customer responded to the suit by charging GE with breach of contract by allegedly making no effort to correct machine malfunctions, and by allegedly not having competent personnel available to service the equipment.

In a counterclaim, ICI seeks over \$250,000 as compensation.

In addition to alleged damages, ICI charged the "type of equipment re-

quested was not installed," nor did the installed equipment, a 420 system, "ever possess the capabilities for which Interstate Computing Inc. was being charged by General Electric."

A federal judge granted the "Writ of Sequestration" sought by GE, ordering the marshal to "seize, sequester, and take into his possession" the computer system being leased by ICI.

'Negative Attitude'

In defending itself against GE's nonpayment charges, ICI noted the original contract was terminated last June because of GE's "negative attitude and failure to assist" ICI on various problems.

Additional problems apparently started when ICI tried unsuccessfully to unload data and programs, and when GE allegedly "ignored" ICI's requests for assistance. Contract extensions had been mutually arranged since June, ICI continued, and were being arranged on a day-to-day basis

in September, when GE obtained permission to seize the system.

ICI claimed GE was to correct the "malfunction" which prevented extraction of the data, but failed to do so. Then, according to the ICI defense, GE came in, extracted the information, and gave it to the marshal, rather than to ICI, "which was the owner . . . and had the obligation for security reasons to protect this information of its customers."

ICI continued to claim that GE, "apparently realizing that it had violated" the contract, attempted to have McDonald Automation assist ICI in the data extraction problem, "if it would not be too late." A communications breakdown apparently doomed that proposal. Don Ellis, majority stockholder in ICI, told CW he had spoken with "11 different management levels" of GE, in attempts to straighten out certain software problems.

Trouble From Delta Merger

One of the difficulties, according to ICI, came about after ICI merged with Delta Data Services early this year. ICI states the merger was "based upon the assurance of GE" that the programs on a Honeywell computer being leased by Delta could be transferred to the GE equipment.

The counterclaim further alleges GE assured ICI that ICI could cancel the Honeywell lease, thus saving \$6,300 a month by placing the programs on the GE computer.

The conversion failed, ICI claimed, and after "several fruitless weeks and at considerable expense to ICI," GE reportedly told ICI that 80% of the Honeywell programs would have to be modified before they could be used on the GE equipment.

ICI could not afford this, the counterclaim charges, and opted to bear the expense of two computers, at a cost of \$53,000 between February and the issuance of the Writ of Sequestration in September. ICI seeks to recover that and other damages in its counterclaims.

Interstate charges GE with violating its obligations by allegedly discontinuing preventive maintenance "during the lease of the equipment."

The customer further charges the manufacturer with violating maintenance agreements by not correcting malfunctions in backup printers. The counterclaim further alleges that an on-line printer, which was not needed and which ICI requested GE to remove, was indeed removed, but "according to General Electric . . . this caused the entire equipment to malfunction."

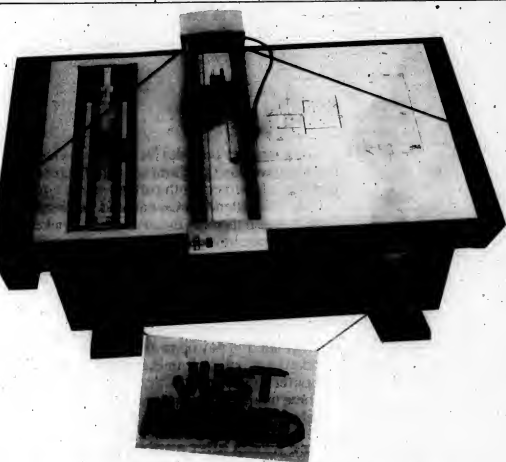
In other allegations, ICI said GE's failure to perform proper maintenance resulted in dirty read/write heads for the disks, causing a "loss of revenue due to downtime" costing \$7,500.

The charges by GE, and lengthy defense by ICI, will be referred in U.S. District Court, Eastern District of Louisiana. Jurisdiction is based on the parties being located in different states and the matter in controversy, namely damages being sought, exceeds \$10,000.

Computerized Traffic Possible in Chicago

CHICAGO — According to James J. McDonough, commissioner of streets and sanitation here, the city has retained Stanford Research Institute of Menlo Park, Calif., to conduct a six-eight-month survey of Chicago's central business district to determine the advisability of installing a computerized traffic control system.

Under the system to be considered, sensors embedded in streets would be on-line to a centrally located computer. Input would reflect traffic loads, and the computer would control traffic signals.



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COMM packages are writing performance records every day.)

F.C.F. is the most flexible communications control system you can buy. It can be used for data collection and message switching...as well as for "front-ending." It all adds up to a uniquely efficient package—totally cost-justified in CPU core and peripheral savings—that will grow as your needs grow. And it will grow without redesign of either hardware or software.

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in a variety of lease or purchase arrangements, give us a call. (In New York (212) 889-4200, in Los Angeles (213) 479-4338.) We can help unlock the profit potential of your computer.

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PDP-11 Gets OS; PDP-10 To Get Algol

MAYNARD, Mass. — Users continue to get systems support from DEC. A disk operating system is available now for the PDP-11 and an Algol processor is being developed for the larger PDP-10 computers.

The company has also established a service group in California to design and build custom computer systems for unique or specialized applications. This special systems group is similar to others previously established in Germany, England and at DEC's headquarters here.

The operating system for the PDP-11 includes a Fortran IV compiler, allowing transfer of source programs between DEC and other computers with comparable compilers.

The PDP-10 Algol will include a shareable compiler, a shareable operating system, and a library of scientific subroutines. DEC said that the compiler will provide extended Algol 60 capability. The operating system will service the

object program, providing general organization, I/O facilities and fault monitoring, DEC said.

Besides the Fortran compiler, the PDP-11 DOS includes an editor, a symbolic assembler, a file management package, a link editor for routines produced by the assembler or a compiler, and an actual debugging package. The system's modular construction permits users to select only those units needed. Additional units can be added, a spokesman noted.

The company said the system is designed to operate on a PDP-11/20 with 8K words of memory. Peripherals supported by the system include fixed head disk storage unit, DEC magnetic tape storage unit, paper tape reader and punch, card readers, line printers, and industry compatible magnetic tape units.

While the PDP-11 DOS is available now, the Algol for the PDP-10 is scheduled for delivery in the summer of 1971.

DEC said that the special systems group

can solve a customer's problem by modifying standard equipment or configurations, connecting DEC equipment to other manufacturers' equipment, or by connecting a controller to a customer's process. The group draws on DEC's spectrum of small, medium, and large computers, solid state controllers, and electronic circuit modules to design and assemble a system to perform a specific task. After the group's system is delivered, it is covered by standard DEC warranties. Systems are also eligible for DEC maintenance contracts, the company added.

Package Cross Tabulates OS/360 Files, Costs \$4,900

BETHESDA, Md. — Cromam, a statistical program, allows OS/360 users to develop cross tabulations of up to six dimensions, with three levels of control, according to Diversified Data Services and Sciences Inc., 4809 Auburn Ave.

Software Bits & Pieces

DRI Network Improves User Awareness of Economic Facts

LEXINGTON, Mass. — Government agencies, industrial firms and financial institutions in need of increased awareness of economic pressures are turning to the National Economic Network developed by Data Resources Inc. (DRI).

The network is designed to provide access to central data banks, to allow users to build simulation models and to generate forecasts of their position in the general economy.

The data bases contain primary economic facts and these are coupled with a basic modeling algorithm to produce a forecast of the national economy. The user builds the model of his company and is then able to simulate proposed changes, to determine how his company relates to the market or industry group. The user is able to store his mathematical models and the specifications of repetitive reports.

The network is available for combined subscription/usage charges. The subscriptions range from \$1,500/yr for basic access to the DRI data bases to \$16,000 for the complete network facilities. Usage charges are \$10/hr for connect time and 15 cent/sec for CPU time. Consulting and educational support are available for additional charge, DRI said.

Data Resources Inc. is at 92 Hayden Ave.

T/S Users Can Start Program Series With One Instruction

BETHESDA, Md. — Users can run a series of independent programs or compilations in succession by typing in one instruction on the Response/360 remote computing system, according to Leasco Response Inc.

Previously, Leasco said, time-sharing users would have to initiate each problem program or compilation separately.

The new capability will allow users to build Basic language programs of virtually unlimited size by automatically transferring execution control from one Basic program to another. In addition, the chaining procedure permits the transfer of control from a Basic program to a Fortran or PL/I program.

Leasco Response Inc. is headquartered at 4833 Rugby Ave.

Architect's Service Builds Bubble Diagram From Matrix

LOS ANGELES — Architects are said to be able to cut the time needed for interior space planning for new buildings by more than 50%, through a service available from Albert C. Martin and Associates.

Martin said that the service is based on information taken from data sheets completed by the user. These show the desired area in square feet of each element to be considered.

A program called Matran optimizes the relationships and generates a mathematical matrix based on the optimal pattern. From this matrix, Martin personnel are able to draw "bubble diagrams." These diagrams do not include any "geographical" constraints, according to Martin, but merely suggest which offices or design elements should be grouped together, by floor if a multi-story design is involved.

The company said that the service costs and turnaround time vary depending on the complexity of the problem, but that \$10/element could be considered an average cost.

Albert C. Martin and Associates is at 445 S. Figueroa St.

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But we've proven ourselves to a number of the country's leading companies.* By solving some problems in simple ways that would intrigue you. So we're ready to widen our circle—show a lot more people how we can fill the gap between them and their computers.

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They are simply designed. And easily operated. Modularly designed. And easily adapted.

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So bring a friend to Booth No. 2520 at the F.J.C.C.

We'll show him how we've helped others solve their problems. With time and attendance recording. With production reporting. With inventory control and materials ordering. With purchasing and receiving.

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*Names available upon request.



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November 18, 1970

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IBM Unveils Keypunch/Verifier, Mag Tape System

By Frank Pianta
Cw Staff Writer

WHITE PLAINS, N.Y. A keypunch that will enable an operator to verify and correct errors before the card is punched, and a magnetic tape subsystem that offers 320K byte/sec data rates at a lower cost than previous models have been announced by IBM.

The keypunch, called the IBM 129 (Card Data Recorder), is available in models to replace both the familiar 029 keypunch and 059 verifier.

The unit incorporates a buffer memory that stores data as it is keyed. This enables the operator to backspace and correct an error before it is punched. Once punching has been started, the operator can start keying the next data card.

Six Format Programs

The buffer memory also permits the storage of as many as six format programs, eliminating the need for drum cards. Two 8K-column cards can be stored simultaneously, permitting the stored card to be punched while the next is being keyed.

Three models are available, the Model 1 that can function as a keypunch and a verifier, the Model 2 that performs printing keypunch functions, and the Model 3, a printing keypunch verifier.

Two features new to IBM keypunch equipment are available with the 129: the production statistics feature counts key-strokes for a machine for work-



IBM's 129 card data recorder uses a monolithic-circuit memory to increase punching speed to 80-column cards. The low-cost 3803/3420 magnetic tape system can match 2420 Model 7 performance.

load balancing and job control purposes, and the accumulate feature shows control totals for selected card fields, for auditing purposes.

The lease prices of the 129 are as follows: Model 1, \$125/mo. Model 2, \$140/mo. Model 3, \$150/mo. Purchase prices are \$6,125, \$6,860, and \$7,350, respectively. First shipments are scheduled for April 1971.

The IBM 3803/3420 magnetic tape subsystem is designed to be used with IBM 370 and most 160 computer systems. It features faster access and rewind times and a choice of recording densities at a significantly lower price than the 2420 tape drives it is meant to replace.

The 3803 controller uses monolithic circuitry and incorporates a read-only control memory that is said to give the

system new diagnostic capabilities.

As many as eight drives can be attached independently to the controller, using a radial interface technique. This interface allows any one drive to be taken out of service for maintenance without disturbing the other drives attached to the controller, IBM said. Previously, IBM mag-

netic tape units have been attached to a controller serially.

The 3420 tape drive is offered in three models with tape speeds as high as 200 in./sec. Seven-track recording at 556 or 800 bit/in., and nine-track at 800 and 1,600 bit/in. are offered. A faster read-access time is claimed for the new drive. Read-access time is the time

needed to skip over the space between data blocks and start reading the next block. Speeds as high as 2 msec are available.

The drives are unusual, IBM said, in that the analog-to-digital signals are converted in the drive rather than in the controller. Other features include automatic threading, pneumatic automatic reel latches and the ability to reuse tape cartridges.

A switching device can be added to the controller to connect as many as 16 drives and four controllers to one or more processors.

The 3803 will lease for \$675 to \$750, depending on features. Sales prices range from \$30,380 to \$33,760.

The lease prices for the 3420 tape drive range from \$440/mo. to \$605/mo. Purchase prices vary from \$19,810 to \$31,280. First customer shipments of the tape systems will take place in October 1971, according to IBM.

Two Low-Cost Terminals From Transcom Use Touch-Tone Signals to Send Data

BLOOMFIELD, Conn. Two low-cost terminals from Transcom, Inc. can transmit numerical data over voice-grade telephone lines.

Designed the IT-016 and IT-

116, the terminals use a standard data coupler to transmit ten numerals and six special characters using Touch-Tone frequencies. The IT-116 comes with an audio speaker for use with time or voice answer-back systems.

The terminals will make it practical, the company said, to collect source data or initiate inquiries from locations that otherwise do not support more expensive terminals.

The terminals can be used, the company said, as a substitute for Touch-Tone pads while providing four to six extra codes for expanded control of data transmitted.

Both units are designed to interface with devices such as the Transcom CPI-16 Card Punch

Interface, to operate IBM 029 keypunches, and the company's PTI-16 that translates Touch-Tone frequencies into ASCII characters. A subsidiary card reader, the CR-20, can also be attached.

The IT-016 can be purchased for \$230 and the IT-116 for \$270. On a three-year lease the IT-016 is \$7.82/mo and the IT-116 is \$9.18/mo. Five-year leases are also available. Both units are available for immediate delivery.

The terminal sends and receives 800 code at 110 bit/sec.

The price of the CT-364 will be under \$2,000. First deliveries are scheduled for early in 1971. Transcom, Inc., a subsidiary of H-G, Inc., is at 12 Tobey Road,

Real-Time Computers Feature Firmware

FORT LAUDERDALE, Fla. A family of computers specifically designed for real-time measurement and control applications has been developed by Modular Computer Systems, Inc.

The nine models, divided into two series feature in-place expandability, user-designed firmware, and modular construction that allows the addition of new technology.

Designated the Modcomp II and Modcomp III, the computers were designed so that separate parts function asynchronously and are packaged in independent modules. This method permits replacement of individual modules as higher performance or lower cost components become available, the company said.

Modcomp computers have an 800-rose main memory that is available with either core or solid state modules.

Minimum memory size in both series is 4K words. The Modcomp II has 16K words. Seven hardware registers are provided. Eight additional registers are built into core memory, and the instruction set includes 152 commands. ROM size can be either 256 or 512 words. Four or eight levels

of interrupt can be handled, and byte parity is included.

The Modcomp III differs in having a maximum memory size of 64K words. All 15 registers are of the hardware type. The instruction repertoire includes 169 commands. The ROM can be as large as 1,024 words, and up to 32 levels of interrupts are available.

Optional features on the Modcomp III not available on the Modcomp II, are floating-point hardware, direct memory channels, and a second memory port for multiprocessor configurations.

The ROM is used as the basic control element in the systems. Customers with frequently used software macro routines can translate these to ROM firmware by microprogramming with a resultant ten to one increase in speed, the firm said.

Because of the ROM, features such as automatic I/O subsystem and emulation of another computer's software can be added to the instruction set.

Four software systems, Max I, II, III, and IV, support the computers. Included are a small core-resident program preparation and debugging system, a batch processing system, a real-time task-oriented multipro-

gramming system that can handle as many as 256 active tasks, and a multiprocessor, multiprogramming operating system.

Peripherals available include fixed-head disks, magnetic tape, teletypewriters, punched paper tape and punched card equipment, and a line printer.

Up to 64 devices can communicate with the computer using the buffered I/O system on a single word, program-controlled basis. Multiple devices can communicate concurrently on an interrupt driven basis at a combined rate of 60K words/sec.

Rates up to 400K words/sec are allowed by the Direct Memory Processor (DMP). Devices such as the disk file, magnetic tape controller, communications controller, and high level as well as wide range analog input systems are connected through the DMP.

The price of the basic Modcomp II/20 system, consisting of 4K memory, basic CPU, and ASR-33, is \$11,900.

Shipments of the Modcomp II are scheduled to begin in January 1971. Those of the Modcomp III are to begin one month earlier.

Modular Computer Systems, Inc., is at 2709 N. Dixie High-

Digital Plotter Accepts Data From Time-Shared Instruments

FULLERTON, Calif. The AutoPro 3500 Digital Plotter, an analytical instrument capable of accepting serial data from time-shared computer or parallel data in dedicated computer applications, has been introduced by Beckman Instruments, Inc.

Designed to process time share data from scientific instruments, the instrument performs as both an incremental digital plotter and a standard 10 in. analog strip chart recorder. It plots in continuous forward or reverse on standard roll chart paper.

The 3500's high and low speed input capability (110 or 300 baud) allows this plotter/recorder to be used with modern high-speed data terminals. It also of-

fers input sensitivity of 100 mV full scale when used as an analog recorder.

Serial data can be received from a standard ASR-33 teletypewriter or an acoustical coupler in ASCII format. Data words may be of any length, however, the last three digits are plotted. Digital data can be received directly from a computer I/O interface, the company said.

The price of the AutoPro 3500 is \$2,250. It is available with a Teletype ASR-33 at a cost of \$3,300. It is currently available on a 30-day delivery schedule.

Beckman Instruments, Inc. is at 2500 Harbor Blvd.

Facom 230 Line Comes to U.S.

Japan Computers May Offer 50% Savings Over IBM

By Frank Pianta

CW Staff Writer

NEW YORK—The first line of Japanese computers offered in the United States will deliver a 50% savings on a price/performance basis over the IBM 360, 370, and System/3, according to the manufacturer.

However, only one model in the line is currently available. The other models will not be available for at least six months, according to current schedules.

Called Facom 230, the series is manufactured by Fujitsu Ltd. and sold here by Automation Sciences, Inc. (ASI).

Competing with the small to middle CPUs of the IBM range, the Facom 230 ranges in size from the Model 15, which Fujitsu said is equivalent in power to the System/3, to the Model 75 which the company said is equivalent to the most advanced IBM 360, 370 computers.

All 230s support multiprogramming and inquiry processing, according to ASI. Conversational time-sharing options, remote job entry, PL/I and Algol compilers, multitasking options, and multiprogramming can be had on most models, ASI added.

The entire line is said to be compatible with the 360 series.

According to ASI, higher level languages are compatible with the IBM computers. IBM OS functions are duplicated, but made simpler, the company said, and easier to use. Data management facilities, library control facilities, as well as job structuring techniques used with IBM systems can be accomplished with Facom software.

Totally Bundled

All Facom systems will be offered totally bundled. Automation Sciences said

that both American and Japanese personnel for systems engineering as well as maintenance would be available to the user. The company will guarantee any software conversion required by special applications, at no extra cost to the user, a spokesman said.

Peripherals to be offered with the Facom are manufactured by Fujitsu and include a 10,000 line/min electrostatic printer, IBM 2314-compatible disk drive, optical character reader, and CRT display, as well as punched card and magnetic tape equipment.

The smallest system, the Model 15, will be available in the second quarter of 1971. It will rent for \$1,600 to \$5,500/mo and features two-partition multiprogramming, virtual memory, and integrated communications line interface channels.

The most sophisticated system, the

Model 75, is a multiprocessor computer which will be available in early 1972 and will rent from \$55,000 to \$300,000/mo. The system features large core storage capacity, 8-way memory interleaving, dynamic system configuration, and an instruction set that can be modified by the user.

The Model 25 is currently available. The more than 500 models have been installed in Japan since 1968. The rental on the 25 ranges from \$3,600 to \$16,500/mo.

The 230-25 is designed for production oriented batch, commercial, and scientific environments. Remote terminals and on-line inquiry can be handled. Three partitions are provided for multiprogramming.

The Facom 230-35 is intended for use in large scale real-time systems. In addition, it has full batch processing facilities. Three partitions are provided for multiprogramming. Large virtual memory will be available, the firm said.

The Facom 230-35 is claimed to outperform the largest 360 or 370 systems. Up to four CPUs can be attached to provide multiprocessing. Price ranges and delivery schedules of the 35 and 45 models are not yet available.

Monitor Operating System

The Monitor operating system for the 230/15 is oriented toward communications and is available in two versions, 8K with no multiprocessing and a 16K version that allows multiprogramming. Cobol, Fortran, RPG and an assembler are provided, in addition to service and utility programs. The Models 25 and 35 can run under the BOS systems that is said to be similar to 360/DOS and TOS. Cobol, Fortran, Algol, RPG and an assembler are supported.

The 35 can also be run under the ROS/BOS-II systems. Similar to the 360/OS MVT with real-time options, the operating system supports Cobol, Fortran, and an assembler.

The operating system for the 230-45 is called OS and is said to be similar to 360 OS/MVT. It is equipped with multi-processing options and time-sharing capability. Languages include Cobol, Fortran, Algol PL/I, RPG and an assembler.

The 230-75 uses a system that is described as more powerful than 360/OS MVT. Called Monitor-V, it includes a conversational interpreter (Baccus) in addition to the languages supported under Facom OS.

Automation Sciences International Corp. is located at 15 Columbus Circle.

UCC Cope Terminal Can Now Interface With IBM 360 Line

DALLAS—Users of IBM 360 and 370 systems will now be able to use University Computing Company's Cope terminals, thanks to a software interface that was developed by UCC.

Interfaces exist to adapt the terminals to the Univac 1108 and CDC 6000 series. Called Cope/360 MAS (Multiple Access System), the interface will enable 360 and 370 users to connect full-duplex, remote-processing terminals to their systems. The Cope Communications Controller, containing the software interface, has been modified to suit the 360/370 channel requirements.

Thirty remotely located Cope terminals can be controlled by each controller. Three computers can be connected to each Cope/360 MAS system.

The system can also be used to control other terminals including IBM 2780s, 1130s, and the 360/20.

The software interface will be available to Cope users at no charge.

Cheer up, Holly Holepuncher. Help is on the way.

That's right. There are some people who care about your problems. We don't think a girl should spend her whole life bent over a hot keyboard. So we've introduced a new optical scanner/card punch that's going to help you and your boss. We call it the Model 710. And it automatically scans and punches up to 6000 cards an hour. So, smile Holly. That means about a half-million fewer keystrokes a day for you.

Leave the card handling to us. We know it'll be love at first sight when you see our little 3x3-foot optical scanner in action. And if your

boss has been away in Siberia, or was born in Missouri, have him call or write us right now for additional details. That's Data Recognition Corporation, 908 Industrial Avenue, Palo Alto, California 94303.

Phone (415) 326-4810.



DATA RECOGNITION CORPORATION

Buying computer tape is a lot like getting married.



No matter what brand of tape you buy, you're gonna have to live with it for a long time. For better or worse. Through read and write.

So it pays to look under the make-up and fancy promises—to find out what you're really getting before you say, "I do."

For instance, one leading tape manufacturer talks about a one year, 200-pass warranty. But the warranty for defective tapes terminates on completion of the first write pass . . . or the first read pass . . . or 90 days from delivery.



EPOCH 4
permanent magnetic tape

And another real sweetheart requires initial use within 90 days. And excludes tape testers.

Then there's Epoch 4—the one with the twenty-year warranty. No gimmicks, no tricky clauses. Epoch 4 will meet the original specs for twenty years. Or we'll replace it.

Sure; it pays to look over the field before you make a commitment—in marriage, or in computer tape. Just be sure you meet the beautiful performer with the twenty-year dowry—Epoch 4 from Graham Magnetics. You'll fall in love with it.

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High-Density Core Increases Mini Memory Capacity

PALO ALTO, Calif. — The use of high-density core allows new models of two Hewlett-Packard 16-bit computers to have increased memory capacity without the use of add-on modules.

The HP 2114C will now have a maximum of 16K words of memory, twice that of the 2114B, while the 2116C will offer 32K words, enclosed in the main frame.

Prices of the new models are no higher than the B series with the same performance, H-P said. The larger 1.6 μ sec 2116C in an 8K configuration is priced at \$20,000, \$4,000 less than the

equivalent 2116B. Savings in the larger sizes are more pronounced. A 32K 2116C, at \$50,000 is \$19,000 less than the 32K 2116B.

The 2114C is offered at the same price as the 2114B, but with double the maximum memory capacity. A 4K model will sell for \$8,500, with additional core at \$4,000 per 4K increment.

Lease plans are also available, offering terms of two to five years, at monthly rates of 4.4% to 2.15% of the purchase price.

The new models will operate, the company said, in the same configurations as the earlier B series, and are compatible with all software, peripherals, processor options, and accessories.

Software available includes

Fortran, Algol, and Basic compilers, drivers for peripherals and instruments, an assembler and other programs.

Six operating systems are available. They include a basic control system, disk operating system, tape system, real-time executive, time-shared Basic, and an educational system.

For the present, according to HP, the older 2114B and 2116B will continue to be available.

The price of the 2116B is being reduced to \$20,000. Reductions also have been made in the cost of the extender and additional core modules, bringing the price of the 32K model to \$58,000 from \$69,000.

First deliveries of the HP 2116C are scheduled for December 1970, those of the 2114C for late January 1971.

Mite 30-lb. Terminal Has Page-Printer

NEW HAVEN, Conn. — A portable terminal, with a page printer, from Mite Corp. is capable of full alphanumeric I/O and weighs less than 30 lbs.

The 123T Data Communications Terminal includes an acoustic coupler, and operates at 110 bit/sec.

The 123T operates with ordinary paper and standard type writer ribbons. One to six copies can be made. The keyboard can be used to generate the complete 128-character ASCII set, with

pre-selected odd or even parity. The unit prints the full 64-character ASCII dense subset.

Single or multi-part 8-1/2 in. paper can be sprocket fed. Single sheets in sizes from 5 in. to 8-1/2 in. may be pressure-roll fed.

Standard equipment includes an automatic carriage return and line feed; parity check for transmission errors, and switch-selectable half or full-duplex operation.

The print line is 80 characters long with 10.8 char/min. spacing. Optionally, 75 print positions per line with 10 char/in. spacing is available. Vertical spacing is 6 line/in.

The unit which includes a vinylized aluminum carrying case is self-contained.

The 123T is priced at \$2,100 in unit quantities. A volume discount is available. The terminal is currently available.

Mite Corp. is at 446 Blake St.

12-bit Minicomputer Features Extensive Instruction Set

PALATINE, Ill. — A 12-bit minicomputer that was developed by Nuclear Data from its dedicated systems, features an extensive instruction set.

The ND 812 set includes 106 instructions, including memory reference, literals, numerical and register commands, control, shift and rotate, and skip commands. The CPU has double accumulators with individual sub-accumulators, and hardware multiply and divide.

In addition, the machine has unusually flexible I/O commands. Using the last four bits of the instruction to provide voltage levels for device selection, 256 I/O commands are possible with single word instruction and a total of 4,096 commands with two-word instructions.

The two-word instruction is said to be convenient for the inexperienced programmer. The combination of two-word instructions and hardware multiple field control provides easy transit across field boundaries, the company said.

The ND812 has 4K words of core memory, expandable in the field to 16K in 4K increments. Cycle time is 2 μ sec. Relative, indirect and direct addressing may be used.

Four levels of programmable priority interrupts are standard and the CPU can trap to any core location in the first 4K of memory.

The control panel features a constant display of the memory register with switch-selected display of six other registers and two buses. The front panel is 45- to 60-day delivery schedule.

Interfaces are available for a variety of peripherals. These include: Teletype, Selectric, paper tape punch and reader, disk files magnetic tape, A/D and D/A converters, graphic displays, light pen, line printer, and an analog plotter.

Software will be provided by the company. An assembler, editor, utilities, diagnostics, an integer arithmetic package, floating-point package and the Nutran interpretive compiler are included.

The basic system with 8K of memory is priced at \$9,950. It is available on a 45- to 60-day delivery schedule.

Nuclear Data, Inc. is at 100 W. Golf Rd.

Rack Holds Forms Binders

HOLYOKE, Mass. — A lightweight floor rack to hold forms binders for either burst or unburst printout is available from National Blank Book Co.

Called the 907, the rack can serve as a single complete unit or as a base for the company's Control-Rack 908, a compatible system that can fit on top of the 907.

**Computer Utility
users
help design
our products!**

WU Intends to Expand Digital Transmission Service

NEW YORK — Western Union has notified the Federal Communications Commission that it intends to install a digital transmission network from New York to Chicago, to link a number of cities, including Philadelphia, Baltimore, Washington, Pittsburgh, Cincinnati, Cleveland, Columbus, Detroit and Indianapolis by 1974.

At the same time the company filed an application with the Commission to build a digital microwave system between New York and Washington, D.C., as the first step in the program.

WU said that the changes will provide users with improved transmission technology, and growth potential to meet present and future communications needs.

Rates for the digital service

have not been proposed, but WU noted that the user will, in any case, be able to eliminate the cost of modems required to convert digital data to the analog

Communications

signals used by the telephone network.

The plan submitted to the FCC specifies that the company will overbuild its existing analog microwave network between the affected cities, adding a 20 Mbit capacity to the network's present 1,200 voice channel (4 KHz analog) capacity. Twenty Mbit is the equivalent of 4,600 2,400-Baud synchronous data channels or 110,000 75-Baud low speed data channels, WU

said.

Initially, Western Union is requesting construction permits to overbuild its microwave beam from New York to Philadelphia, with a completion date in late 1971. The company said it will file shortly to extend the digital capability from Philadelphia to Washington, with a completion date early in 1972.

WU explained that this proposed first system will make it possible immediately to transfer a large portion at least several hundred channels — of existing digital type traffic from the analog system.

It will create an optimum transmission facility utilization condition by handling analog traffic on the analog system and digital traffic on the digital

system, a spokesman added.

Western Union also has pending before the FCC an application to build a hybrid microwave

system between Atlanta and Cincinnati which permits both digital and analog transmission on the same microwave channel.

Common Carrier Bureau Asks to See AT&T Study

WASHINGTON, D.C. — The

American Telephone and Telegraph Co. has been "invited" by the FCC's Common Carrier Bureau to submit details from an oft-quoted study the carrier made of the data market. The Commission said that it would like to be able to consider AT&T's findings in the proceedings on specialized common carrier services, under Docket

18920.

The request for the AT&T study was made in a letter from Bernard Strassburg, chief of the Common Carrier Bureau. He noted that AT&T's original comments under Docket 18920 offered summary figures of the projected private line market, but did not contain the material to support such projections.

The COPE mylar tape punch.
(There's a reader, too)

The COPE 30 remote terminal.
(One of eight.)

The COPE printer.
(Perfect mate for the 30.)

Our 30-inch incremental plotter.
(We've a new 14-inch model if you want it.)

The Datal 31 terminal.
(Datal 30's big brother.)

The Datal tape cartridge.
(Goes with our tape deck — or all alone.)

Look what they've done for us lately.

We built the Computer Utility Network when most people, except a handful of computing engineers, said it couldn't be done. And through the Network, UCC and its customers have evolved a wide range of products to allow users to realize the full advantages of computer power... by accessing UCC's large-scale computer centers from terminals at their own locations.

For instance, our COPE line of high speed remote batch terminals is industry's broadest (ranging all the way from the new COPE 25 to the proven .45). For the timesharing user, the UCC-Datal keyboard data terminals provide point-to-point communication and computer interface, with the model 31 offering an added benefit — a simple, reliable magnetic tape recorder which gives an off-line data capturing capability that results in greatly reduced transmission costs.

Other UCC products include incremental plotters and computer output microfilm (COM) equipment, tape decks, multiple speed modems and even tape

cartridges — but for computers instead of stereos. Whether or not you're now using our Computer Utility, you'll find UCC products best for accessing computer systems — yours or ours. And if you're making systems to sell someone else, remember ours are user designed components.

For more information on how UCC computing products can work for you, contact: Corporate Marketing Dept., 110 W. The UCC Tower, P. O. Box 6228, Dallas, Texas 75222 (214) 637-5010.

UCC

UNIVERSITY COMPUTING COMPANY

Corporate Offices: The UCC Tower
P. O. Box 6228/Dallas, Texas 75222

New York Stock Exchange ticker symbol: UCC

Future Comm Lines Might Carry Up To Billion Bit/Sec

MURRAY HILLS, N.J. — Communications lines in the future may be able to carry up to a billion bit/sec over a laser beam.

This figure, four to five times the capability of previous systems, is made possible through the use of high-speed electronic circuits developed by a Bell Laboratories scientist.

Devised by Gerard White for use in optical communication systems, the circuits are a significant step toward utilizing the large message-carrying capacity of lasers.

A communications system using laser light offers the prospect of carrying telephone calls, data messages, television and Picturephone signals simultaneously in bundles perhaps 10,000 times larger than now possible with microwaves.

Until now, relatively slow electronic circuits were used in the process of transmitting information-carrying signals over laser beams.

Information Multiplexed

Through the use of high speed circuits, information streams can be electrically multiplexed prior to impressing them onto a laser beam.

White's high-speed circuits are comprised of four transistorized switches or gates, fabricated in microstrips of thin film.

Four different pulse streams, each capable of transmitting 250 million bits (Mbit) of information per second are electrically multiplexed, or combined, into one stream using a form of integrated circuitry.

The resulting gigabit-per-second pulse stream is then impressed onto a laser beam. This latter process, called optical modulation, takes place within a crystal device called an optical modulator.

To help reduce the voltage, White uses a technique called etalon tuning. This is a frequency "filtering" system commonly used to eliminate all but one frequency from the laser beam. The result is a pure optical beam that can be modified satisfactorily with about 5V or one sixth the previous required level. With less voltage needed to activate the modulator, both electrical and optical signals can be made to interact through this device efficiently and at approximately the same ultra-high speed.

Once modulated the laser beam acts as a "carrier" for the stream of high-speed information signals. Sophisticated electronic circuits can recover these multiplexed signals by separating one message from many being transmitted simultaneously over the light beam.

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Test Cassette Checks Speed, Head Alignment, Skew

MOUNTAIN VIEW, Calif. — A test cassette for use as a reference in the testing of cassette recorders and transports has been introduced by Information Terminals Corp.

The cassette can be used for testing long- and short-term speed accuracy, head alignment, output level, and both static and dynamic skew.

Three hundred feet of computer-grade tape are pre-recorded with saturated full-width pulses, spaced at 800 or 1,600 flux changes per inch.

Information Terminals Inc. is

at 1160 Terra Bella Ave.

Retrieval Terminal Uses Roll Microfilm

PALO ALTO, Calif. — Microfilm can be used in "almost real-time" applications with a terminal from the Morgan Information Systems, Inc.

The device uses roll microfilm which can carry as many as 45,000 pages of computer print-out on a 100-foot roll of 105mm film.

A second roll of 16mm microfilm with revisions or new information can be used to update

the microfilm.

First deliveries will begin in January. Prices will range from \$3,750 to \$7,000.

Morgan Information Systems, Inc. is at 3197 Park Blvd.,

dp

accessories

Power Analysis System Tracks Malfunctions

FORT LAUDERDALE, Fla. —

The Data Power Sentry, developed by Data Research Corp., is a power analysis system that monitors and records power malfunctions continuously for weeks at a time without surveillance.

The package is composed of a recording device, a timing reference, housed in a single unit.

The unit is available for 115, 208, or 230 V lines. Transients as short as 0.1 msec are analyzed and recorded at levels of $\pm 10\%$ and $\pm 20\%$ of the nominal voltage. Data Power Sentry sells for \$1,470, and leases for \$51.20/mo.

Data Research Corp. is at 2601 East Oakland Pk. Blvd.

Five-Second Retrieval Claimed for Filing System

MARIETTA, Ohio — Five

second push-button retrieval, 50% faster than any other unit of its type, is the claim for the Lektrevier-100 automated filing system by Remington Rand Office Systems Division.

The unit offers an adjustable posting board that can be moved to a standing or sitting position.

The unit is primarily intended for office use, but is also appropriate for housing and automated retrieval of computer tapes, drugs in hospital dispensaries, and retail items in department stores.

NCR Introduces

Forms Handling Line

DAYTON, Ohio — NCR added forms-handling equipment to its line with the introduction of decollators and bursters.

The two- and four-part decollators are available with add-on modules to handle eight-part forms.

Also being offered are single and multi-part forms burster with optional equipment including slitters or stackers.

File Guides Use

System/3 Cards

CHICAGO — Three styles of file guides for IBM System/3 cards have been announced by the G.J. Aigner Co.

The guides are designed to separate card sections within card decks to speed card removals, handling and refiling.

The G.J. Aigner Co. is at 426 S. Clinton St.

COMPUTER TIME

\$100.00/HOUR

BLOCKS OF NON PRIME TIME

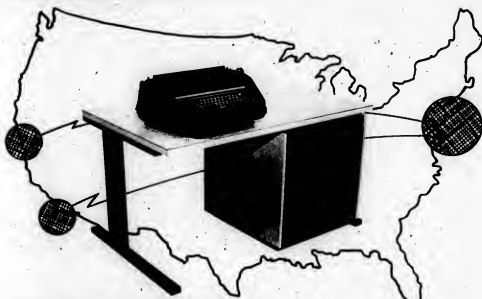
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Computerized Zip Code Map Offers Many Market Services

PRINCETON, N.J. — Between the country's 49,000 Zip Codes and a computer, Geodatic, Inc., a marketing service firm, has developed an approach that directs customers to their nearest stores for advertised products and shows manufacturers where their markets are and where they're not.

The Geodatic approach is based on the ability of its NCR Century 200 computer to match the names and addresses of customers and retailers to an internally stored Zip Code map of the U.S. whose coordinate designation is accurate to

the nearest minute of latitude and longitude.

The computer matches the Zip Codes on the bingo cards received inquiring about products in a magazine with those of dealers. Within 24 hours a personalized letter is printed thanking the reader for his inquiry and indicating the retailer closest to his address.

If there is no outlet within the immediate vicinity of the reader, the computer will list the nearest one outside the area.

At the same time, the computer prints the names and addresses of the readers so that the dealers can follow up inquiries.

The advertiser is sent a listing of potential customers and the dealers to whom they were referred. Manufacturers can use this summary to test the draw of their advertisements and, to some extent,



Punched cards created from inquiries through Reacts (Reader Action Service) are readied for entry into the NCR Century 200 computer that will prepare personalized replies to prospective customers of advertisers.

the performance of their distributors.

On request, manufacturers can receive a computer printout in the form of a map of the U.S. showing where there is demand but no distributors.

Where readers ask for literature only, the computer automatically generates

mailing labels for the manufacturer to use on the promotional material.

In this manner, no inquiry goes unanswered and, operating at the rate of 2,500 letters per hour, the computer turns around a request within a week, including mailing back and forth.

Bank Uses AF Display System

NEW YORK — Chemical Bank has its own electronic control and planning center in a commercial application of a Delphic II data display system originally developed for the Air Force and used by the Alaskan Air Defense Command.

The system will be aiding senior management in decision-making and long-range planning by quickly generating economic charts which usually take man more than a half a day to complete.

William S. Renchard, Chemical chairman, said, "Here we can forecast almost immediately, and with a high degree of accuracy, cash flows for the businessman or graph broker loan volume for the brokerage house."

The system, which is compatible with Teletype keyboard and EIA video computer terminals, includes a scribing data projector, a digital data converter, a servo electronics unit and a power supply unit.

With a high-speed computer link, the Delphic II projector can generate a complete four-color economic chart, including coordinate axes and titles, in less than two minutes. The chart is projected as it is being drawn.

The time for a complete chart can be reduced to seconds when the system's two auxiliary 35-millimeter projectors are used to display background slides, and the Delphic II is used only to generate the data curves.

The data converter of the system accepts digital information from the computer over a telephone line. The information is converted to analog X and Y coordinate commands and "plot" commands, which direct the servo-driven stylus frame.

Hospital Streamlines Procedures, Controls In Administration

FITCHBURG, Mass. — Burbank Hospital has put a computer to work to streamline administrative procedures and increase management controls.

At this time, the hospital has automated its billing and receivables, payroll, personnel accounting, accounts payable, and general accounting, and has a system to keep track of every bed, patient, doctor, and service area of the hospital.

Compact typewriter-like terminals currently connect the admitting and business offices of the hospital with a huge computer facility in Watertown, Mass.

Despite the distance involved, the terminals bring the power, speed, and accuracy of the computer into the work areas of the hospital.

The computer service is provided by Medinet, a department of GE.

The computer applications at Burbank were installed and operating successfully within two months after installation began.

A dirty tape can put a computer down.

Depressing. Dirty tape causes data dropouts. And dropouts cost you money. That's a bad scene.

RCA Computer Tape helps keep computers up.

It's a special formulation that

starts cleaner. Every inch of every reel is tested and certified in the cleanest of white-room conditions. (No statistical testing for us.)

And it stays cleaner, longer.

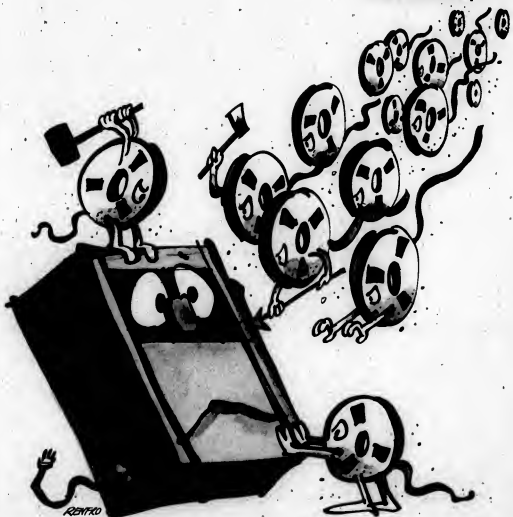
Result? Fewer dropouts, more

efficient computing.

Show your computer what a good scene really is. Write RCA Magnetic Products, 201 E. 50th St., New York 10022.

Our tape makes it.

RCA Computer Tape



ACM Offers Free Ad Space

NEW YORK, N.Y. - ACM will make available to any unemployed ACM member free space for two 1-in. Situation Wanted ads per year in the classified section of *Communications*.

ACM will also continue uninterrupted association membership for any member who is unemployed, for a period of 90 days beyond his anniversary renewal date. Payment within that period will reestablish his membership as of his anniversary date.

Walter Carlson, president, said ACM plans to monitor the current employment situation to evaluate the need for modifications of the new program.

The deadline for insertion of free ads is the 5th of the month preceding the month of issue. Send ad to: Classified Employment Ads, Communications of the ACM, 1133 Ave. of the Americas, New York, N.Y. 10036.



COMPUTERWORLD

societies/user groups

Cedpa to Hold Meeting Dec. 3-4

SAN FRANCISCO - The California Educational Data Processing Association (Cedpa) will hold its 10th Annual Conference Dec. 3-4, at the Oakland Hilton Inn.

Sessions and discussions relating to the theme: "Educational Computing: Expectations vs. Realities" will deal with computer-assisted instruction, time-sharing, information systems, guidance, testing, research planning, programming, budgetary session (PPBS), comprehensive achievement monitoring, data management, financing, and computers in the classroom.

Conference speakers will be Guy Dobbs, vice-president, Xerox Computer Service, and Judy Edwards, Project Reat, Northwest Regional Educational Lab.

A preconference workshop will be held Dec. 2-3 on PPBS.

The four hour workshop will cover current programs, examples from pilot school districts, and program reporting structure.

Registration is \$2 for Cedpa members, \$3 for nonmembers.

For more information write Cedpa, 77 Teresita Blvd., San Francisco 94127.

Tel-Tech OEM Modems: Hard to believe. Crystal controlled. TTL IC logic. Ultra-reliable operation. Error-free performance. Compact. Economical. And maintenance-free.

Our Bell-compatible 103 (up to 300 bps) and 202 (up to 1800 bps) asynchronous OEM modems consist of merely one small, low-profile PC card. Even an optional 5 baud reverse channel can be incorporated on the same card. Should you desire synchronous operation, we'll provide another PC card for that. And, our Bell-compatible 201's (synchronous at 2000 or 2400 bps) use only two compact, low-profile PC cards. If you require a PC card of different dimensions, we're set up to reconfigure our OEM modems to your exact requirements.

And—for your central sites—up to 10 modems can be accommodated in one of our 19" racks and share a common power supply.

Prices start at less than \$200/modem in small OEM quantities. Hard to believe. But true.



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In Canada: Caniotech, Ltd.

Bell-Compatible OEM Modems Off-The-Shelf Delivery

Innovation Topic Of Symposium

MECHANICSBURG, Pa. - Professional and academic leaders in the DP world will probe the use of "innovation" as a tool during a symposium scheduled by the defense activities at Mechanicsburg Naval Depot.

The event will be held Nov. 23-25 in the convention center of the Penn-Harris Motor Inn, Camp Hill.

Purpose of the symposium is to provide a forum to help DP specialists keep up with rapidly changing technology.

Attending will be more than 300 representatives from local, state and federal governments as well as Navy and other Defense Department activities.

Dr. Robert Anthony, former assistant secretary of defense for financial management, and Rear Adm. Kenneth R. Wheeler, commander of the Naval Supply Systems Command, Washington, D.C., will be among the speakers.

Dr. H.R. Grosch will speak on "Standardization and its Role in the Future." Cmdr. Grace Hopper will chair a panel on Anti-Cost.

Five ISA Districts Elect Vice-Presidents

PITTSBURGH - The Instrument Society of America (ISA) has announced the election of district vice-presidents in five of ISA's 11 membership districts in the U.S. and Canada.

Elected by delegates from the ISA sections in their home districts, they will direct their district's activities during two-year terms beginning Nov. 1, 1970. They are: District II (central Atlantic) - Allen H. Keyser, market manager, environment-utilities/government, Honeywell Inc., Fort Washington, Pa.

District IV (western N.Y., western Pennsylvania, West Virginia) - Charles F. Bassett, senior engineer, automatic process control group, Eastman Kodak Co., Rochester, N.Y.

District VI (Midwest) - Emanuel Malin, chairman of the board, Malin Instrument Co., Louisville, Ky.

District VIII (Southwest) - John R. Williams, senior instrument engineer, Stearns-Rogers Corp., Denver, Colo.

District X (Canada) - V. Stanley Weiss, president, Weiss & Associates, Montreal, Quebec, Canada.

District XI (Northeast) - V. Stanley Weiss, president, Weiss & Associates, Montreal, Quebec, Canada.

District XII (South) - V. Stanley Weiss, president, Weiss & Associates, Montreal, Quebec, Canada.

Brabb Named Data Educator

NORTHFIELD, Vt. - Dr. George J. Brabb of the University of Montana has been named 1970 Data Educator of the Year by the Society of Data Educators. Brabb teaches courses in quantitative analysis and computer systems, and has been involved in the field of data education since 1958.



Marketing Plan Urged to Give Authors Incentives

CW West Coast Bureau
BEVERLY HILLS, Calif.—At a conference on "Computers in Instruction—Their Future in Higher Education," Dr. Roger Levien, Rand Corp., said that technological advances in computer sciences will be meaningful in the instructional field only if a marketing system is devised that provides incentives to authors and distributors of the materials.

Levien, chairman of the conference, was reporting on a Rand study developed under a \$100,000 grant from the Carnegie Commission on Higher Education and a \$45,000 grant from the National Science Foundation.

Over 130 Attended

The conference was attended by more than 130 invited guests in the education field and was sponsored by the three participating organizations.

"It is already possible for a system to be worked out whereby an author would

collect royalty payments each time his material is selected by a user of a time-shared computing service or sold in cassette form," he said.

He predicted the day when organizations, "like publishers of textbooks

Education

soliciting instructional materials from faculty authors, store them in a central computer facility, then market them like textbooks with the time-sharing service providing the mechanism for distribution."

Levien said the nation's computer power will grow a thousand-fold in a decade from 1965-75. Although education now represents less than 5% of the market for computers, he expects growth of the technology to have an increasing effect upon the campuses.

He noted that the number of colleges and universities with computers has grown in eight years from 200 to 1,250—and that's only half of the nation's campuses.

While the amount of money spent by higher education in computer activity multiplied over seven times between 1962 and 1969 (from \$49 million to \$352 million), instructional activity accounts for only about 30% of that. Administration uses 30% and research uses 40%.

Levien sees in the coming era the ability to program a computer to do the work of an engineer when he is applying well-developed design processes to a standard product; the work of a linguist when he is parsing a sentence in any one of several major languages; the work of an industrial manager when he makes a standardized decision such as when to reorder his inventory; and the work of a teacher when he explains the essentials of a well-understood subject to beginning students.

T/S Consortium

WELLESLEY, Mass.—A time-sharing academic computer consortium among six Greater Boston area colleges and Milton Academy has been formed under the auspices of Babson College. Joining Babson and Milton Academy in the Academic Computer Group (Accomp Group) are Bentley, Boston, Curry, Regis and Simmons colleges.

The Accomp Group was formed to take advantage of recent advances in time-shared computing and to help its members provide greater computer services at reduced costs.

The Accomp Group uses a Hewlett-Packard 2000A computer system, housed on the Babson campus, solely for academic purposes with costs based on each member's service requirements.

More members can be accommodated on the present computer system and efforts will be made to attract other area colleges and schools to the Accomp Group.

Chemists Learn Mini Techniques

PALO ALTO, Calif.—Purdue University's chemistry department is teaching minicomputer techniques to practicing chemists and educators from schools and businesses throughout the U.S.

Results of the course work are gratifying, said Dr. Sam Perone, head of the



One of Purdue University's students prepares a program on a Hewlett-Packard computer for the course "Digital Computers in Chemical Instrumentation."

course, "Digital Computers in Chemical Instrumentation."

"Our students return to their laboratories and schools confident that they can use computers to solve their chemical problems," said Perone.

Digital Logic Design

Half the extensive three-week course centers on digital logic design as applied to analytical instrumentation, the second half to machine language programming. One group learns Assembly Language programming. The students solve specific chemical problems and go over sample solutions.

The other group of students directed by Dr. Harry Pardue, learns the use and selection of digital logic circuits for specific chemical instrumentation applications.

"This area is more difficult for the chemist to understand since he is accustomed to analyzing analog signals and reactions," said Pardue. Midway through the course the two groups of students interchange their areas of study.

Six Hewlett-Packard computers, two 2114As, two 2115As and two 2116As are used in the course.

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Business Schools Have Greatly Expanded DP Curriculum

COLORADO SPRINGS, Colo. — In the past four years, U.S. schools of business have upgraded their curricula by the bootstraps to produce graduates who will be effective managers in a computer-oriented environment.

The faculties have had to acquire a computing proficiency on their own, since professionals and graduates of doctoral programs have not added significantly to their ranks.

In 1966, a *Computing Newsletter* survey of 139 American Association of Collegiate Schools of Business (AACSB) revealed that only 11% required students to be proficient in computer programming.

Today, 62% of the schools have such a requirement, according to the survey.

Other changes are evident in that a required course's objective has been transformed from understanding the potential of the computer for business organizations to enabling the student to use the

computer in his own academic program.

The basic course, previously given to students in their last year of school, is now part of the initial phases of the curriculum.

In 1966, the survey indicated, the computer was used to a negligible extent as a problem solver in the functional area courses: accounting, finance, production, marketing, and personnel. Today, the heart of the computing curriculum is taught in these courses.

What is now a standard four-phase approach involving the computer curriculum as an integral part of the required business school curriculum was rare in 1966.

The approach includes coverage of:

- Computer fundamentals, systems analysis, and design and programming
- Computer applications through incorporation of this material into the functional area courses
- Computer capabilities for improving

decision making, through computer-oriented business games.

• Integration and optimization of computer applications through a course on design and integration of a management information system.

Computing Cost

The cost of computing is shown to be less than 9% of the total budget for two-thirds of the business schools, but more than 19% for one-fifth of them.

Cost of computation per student ranges from \$4.20 to \$1,060; more than half of the 35 schools responding indicated costs of less than \$50/student year. Cost per student is inversely proportional to the number of students, but some of the larger schools do not provide as much computer access per student.

The cost figures reflect total computer cost, including hardware, personnel, supplies, but not the cost of instruction.

Generally, university budgets are the

principal source of funds. Less than 5% of the schools receive more than 15% of computing funds from outside sources.

An option in information processing has been adopted by 24% of the schools; another 15% plan to implement such an option by the 1972-73 academic year.

Few schools in 1966 used time-sharing, according to the survey. Today, over one third of the 90 schools having a central campus facility have time-sharing capability. Forty business schools have their own computers and 17 of these computers also have T/S capability. Most schools use a combination of sources of computing, the report states.

Fortran is still used by a majority of the schools. Of the 79 schools with a computer programming course requirement, 49 require Fortran, 10 use Basic, and six use Cobol.

"Lack of interest by faculty appears to be the greatest deterrent to adoption of computer content in the required school of business curriculum," states the newsletter.

Schools are employing a variety of approaches in an effort to encourage their faculties to gain proficiency in this area. Many reported requiring computer proficiency as a condition of employment for all new faculty.

One school, according to the newsletter, indicated its objective has been to "hire a computer nut" in each functional area so he could assist colleagues in developing applications for classes.

Honeywell Opens New Institute

BURLINGTON, Mass. — The Honeywell Institute of Information Sciences (HIIS) has opened a new \$1.5 million educational facility adjacent to Route 128 where it doubles the capacity of the former home of HIIS in Woburn, Mass.

The 21,000-square-foot facility will house two third-generation computer systems made by Honeywell's EDP Division. There are 10 classrooms, a student lounge, library and a keypunch room, in addition to administrative facilities and the computer room.

"Our students will be given extensive 'hands on' experience with a million dollars worth of computer equipment," John MacDougall, institute director, said.

We will have a Model 200 and a Model 120 computer, each with four tape drives, two disk drives, a card reader/punch and a high-speed printer," MacDougall said that a third computer system will be added early in 1971.

Accounting Seminar

GALESBURG, Ill. — Knox College will sponsor a two-day seminar on "The Role of the Computer in Accounting Education," Dec. 3 and 4 and will include accounting demonstrations and "hands on" experience using the computer with exercises from selected publications.

Authorities will report on their experiences of using the computer in accounting education at small, medium and large-size colleges and universities.

The conference will be supported by a joint grant from IBM, The Sloan Foundation, and the Esso Education Foundation.

Enrollment in the conference will be limited to 40 with one representative per institution. The participant must be a teacher of accounting at an accredited college or university in the U.S. or Canada.

Interested persons should request an application from: William F. Pillsbury, Department of Economics, Knox College, Galesburg, Illinois 61401.

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Satellite Plant Is Nerve Center Data Net Gives Daily News New Angle

LOS ANGELES—The Los Angeles Times has developed a new publishing concept which combines the best features of a major metropolitan newspaper with integrated coverage of a major suburban area.

Computerized copy preparation and high-speed data transmission make this possible. All copy written for The Times is computerized in Los Angeles.

As news is entered and recorded by the computer, a new log is prepared which lists every story written, its writer, its subject and its department. This log is prepared by the computer and transmitted via teletypewriter to the Orange County newsroom.

Orange County

The nerve center for this new angle on the metropolitan-suburban daily newspaper is The Times' satellite printing plant and newsroom at Costa Mesa, Calif., in Orange County, about 35 miles from downtown Los Angeles and the main offices and plants of The Times.

From the Orange County plant The Times produces a daily paper that combines the best elements of the major metropolitan editions of The Times with total local coverage of the numerous communities in Orange County—population one million plus.

News Editor Burt Folkart and his staff select stories they wish to include in their "local" Orange County Edition.

Then, using an IBM typewriter, they signal the computer in Los Angeles to retrieve any given story.

Phone Lines

The full story is then sent over one of six dedicated telephone lines from the computer in Los Angeles to the Orange

County plant and is usually printed out by a Dataspeed Printer within seconds after the computer has been contacted. Orange County can also receive copy on paper tape or over the IBM typewriter.

In the composing room of the Orange County facility there are additional IBM typewriters, two paper tape readers, two paper tape punches and a Dataspeed Printer.

The composing room has the capacity to access the computer in Los Angeles.



A linotype operator at the Orange County Satellite facility sets the copy tape on the linotype for automatic type preparation.

directly, without going through the editorial department.

Advertising copy for publication in the Orange County Edition is set and made up in the facility's composing room in the conventional way. A modern pressroom within the facility prints the Orange County Edition.

The traditional fleet of trucks then fans out the edition to distributors throughout the county.

The Times' leadership in computerized typesetting and copy production is an important factor in the success of the Orange County satellite. At The Times' main plant in Los Angeles, there are four paper tape terminals and two high-speed typewriter terminals used exclusively for preparing punched tapes to run the linotype machines in composing.

The linotype machines produce the type for all editions from the paper tapes on which the body copy of the newspaper has been recorded.

Ninety percent of all type prepared for the production of the Los Angeles Times is prepared on tape, making The Times the most computerized newspaper in the world.

All editorial departments of The Times, including the satellite at Orange County, use a special format to identify copy for the computer.

The computer recognizes the slug line and originating desk as copy is entered. Selected indexes of copy are printed in Orange County on hard copy—the new log. The log has all the information the Orange County staff needs, if they desire to retrieve the story from the computer.

If a page from the metropolitan edition will be used intact for the Orange County Edition, a page mat duplicate is prepared in Los Angeles and sent to the Orange County plant for final production.

Whenever a change in a page is decided upon by the editorial department in Orange County, the type is reset in the Orange County composing room.

Before the operation of this flexible, fast system of story retrieval, page proofs of metropolitan pages were sent via other methods to the Orange County plant. All of these were too slow, and beating the



View of the composing room, Orange County Plant, Los Angeles Times.

deadline became an unreasonable problem.

The wide use of telecommunications is no novelty for the Los Angeles Times. In a recent address to representatives of the Pacific Telephone Co., Angelo Musante, DP director and assistant to the executive vice-president and general manager of The Times, outlined how the Los Angeles Times uses the facilities of the Bell System communications network for administrative operations in Los Angeles as well as for the unique satellite plant in Orange County.

Accounting data concerning local advertising, for example, is transmitted over the telephone network to the computer center in Los Angeles. Billing is also handled by the computer.

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The first three 700 Systems. The B 7700 (3 models): A very large scale system with up to eight processors, 16-mHz central processors, I/O data rates up to 30 million bytes/second, 6-million-byte main memory, phased and interleaved four ways for 60-nanosecond accessing. Up to 112 billion bytes of high speed diak memory. Over 4,000 data communications lines. "Fail-soft" design for continuous processing reliability.

The B 7700 offers exceptional power and versatility for heavy data base and data communications applications. Deliveries begin in

early 1972.

The B 6700 (5 models): Expandable from a one 5-mHz processor intermediate size system to a three-processor large scale system without reprogramming. Up to 3 input/output processors. Up to 12 data communications processors that can service a 3,000-line network with no central system "overhead." 6-million byte-main memory. Over 80 billion bytes of on-line random storage. "Fail-soft" design.

Deliveries start in February, 1971. So, the B 6700's easily the most advanced business data processing system now available for service.

The B 5700 (2 models): A one- or two-processor system for productive, economical time sharing, data communications and batch processing. With many capabilities of larger 700 Systems. Deliveries begin this year.


Burroughs-proved advanced features.

The B 6700 and B 7700 and the new facilities incorporated in the B 5700 use the latest version of monolithic integrated circuits (introduced in Burroughs commercial computers in 1967).

All three systems come with programmer-independent virtual memory, reentrant code, compiler-language programming, system expansion without reprogramming, plus automatic multiprogramming or multiprocessing, dynamic resource allocation and self-regulation under Master Control Program supervision.

New disk storage. B 6700 and B 7700 systems are offered with Burroughs new diak-pack storage which offers average access times of 30 ms, and a new "Optimized Access Memory Bank" featuring multi-billion-byte capacity

Burroughs



"Ease of systems management
and ease of programming,
built on powerful systems'
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"The new Burroughs 700
Systems extend that leadership."

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President, Burroughs Corporation

with effective access times of 2 ms to 6 ms.

The B 5700 offers a unique disk storage system that four separate systems can share.

Ease of use means lower cost over systems' life. Burroughs new 700 Systems offer significant improvements and increased power. And our systems design continues to emphasize productivity combined with ease of programming and systems manageability, economical expansion without reprogramming for systems in each performance range, and, most important, exceptional responsiveness to management.

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B 6700, which is ready now, is a powerful problem-solving system for the user who maintains a very large data base, who needs flexible, efficient data communications and remote computing, as well as the high work output that system-controlled multiprogramming and multi-processing can provide.

While the B 6700 marks a substantial performance improvement over the current B 6500, the new system accepts programs written for the B 6500 without modification.

The B 7700 is the most advanced and largest of the 700 Systems. This versatile system, which is now functioning as a design test model, is completely compatible with the B 6700. This means Burroughs users can progress from the B 6500 to the B 6700 and to the B 7700—a move of very great dimension—without re-

programming.

A commitment to systems users. The B 5700 supports Burroughs' commitment to provide its users with continuing enhancements and improvements in the intermediate systems range. Moreover, the B 5700's advanced architectural design and its extended data base management and data communications capabilities will attract many new users to Burroughs.

These new 700 Systems reflect Burroughs' policy of continually improving products through creative engineering. At Burroughs, technological progress goes hand in hand with an appreciation of how data processing systems can help management get the job done best and at the lowest true cost.



Maternity Care May Be Aided With Upgraded Filing

CHICAGO - Physicians at the Department of Obstetrics and Gynecology at the University of Chicago Lying-In Hospital have undertaken a project to determine whether maternity care can be improved by replacing the traditional chart-oriented patients record file, with a com-

puter-based obstetric patient data filing system.

The system is intended to prevent accurate summary information about the patient to the physician, evaluate laboratory tests and output warnings of abnormal values to the physician; stimulate referrals to appropriate specialty clinics; and identify high-risk maternity patients.

"Pregnancy is a time-limited process, and medical care during this period requires repetitive use of current patient information. The conventional pattern of obstetric patient card often

causes delays in information flow to the physician," noted the project director, Dr. Michael J. McKown.

"Many delays are a result of the traditional patient record-keeping system: in practically all hospitals, information is chart oriented. The primary destination of information is to the paper chart and the return of information to the physician is usually a secondary consideration," he added.

"A computer-based system is capable of maintaining an active patient record at all times, and

updated summary information is produced without inactivating the primary patient record. Incoming new information is added as it arrives.

"The flow of information goes to and from the patient record. However, the patient record is now an active holding area for information, which is essentially physician-oriented in its flow patterns," he said.

Called, Obfile, the system is based on a DEC PDP-8/i computer and a much larger IBM 360/65. Upon physician request, the DEC computer outputs a summary "subset" of a patient's main active record file. Information is of two types.

A cumulative summary of pertinent information during the prenatal period, which will contain warning messages advising the physician of abnormal laboratory values, adverse consultation reports, and other "meaningful" information about the patient.

The second type will be a condensed summary of the patient's prenatal course. This summary is available on demand, via Teletype, at about 36 weeks gestation. It is updated as new information is available to the system.

Physicians compile data for the Obfile using forms that incorporate the characteristics of the traditional hospital chart, in which the physician answers general questions in a free-form discussion format, and the more rapid straight coding form.

The Obfile form includes structured coding, but also leaves space for the physician to make comments whenever a coded answer is insufficient. The system output warns the physician when certain patient data is missing and asks that he supply it.

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Mini Has Guide To Publications

POMFRET, Conn. - The time-consuming and often boring task of unearthing little known periodicals - publications not found in the Reader's Guide to Periodical Literature - and researching them for various class assignments is a thing of the past at Pomfret School because of the introduction of a computer.

Students do not have to search indices of innumerable unrelated magazines when looking for a particular article. They simply scan a list of topics that have been classified.

If one or more of the topics seems pertinent to their needs, they activate the school's DEC PDP-8 via a teletypewriter in the school library. In a few seconds, a printout is prepared, which contains a list of all classified magazine articles pertinent to their subject. The disk memory of the computer contains a two-year listing of selected magazine articles.

According to William C. Ulbrsky, science department head, "The action was prompted by the school librarian, John Williams, who was under constant pressure to help find source material for student term papers."

Mars Mission To Get Mini Watchdog

PASADENA, Calif. — Before the Mariner Mars 1971 mission gets off the ground with its vast scientific payload, complex systems are being checked, double-checked, and triple-checked by a Varian mini-computer.

At California Institute of Technology's Jet Propulsion Laboratory (JPL), in association with Nasa, preparations are being made for the Mars Mariner mission scheduled for March.

The scientific payload of the mission is designed to observe and map the surface of the red planet, searching for signs of life or the presence of an environment that could support exobiological activity.

'Fault Isolate'

Testing of this equipment at JPL is complex and can be time-consuming. The payload is being tested in a program called the Science Operational Support Equipment (Sose) function, whose purpose is to "fault isolate" malfunctions on the science payload subsystem, i.e., to detect and pinpoint any part, circuit or assembly that isn't working.

The minicomputer is assigned to check out an ultra-violet spectrometer; an infrared radiometer; an infrared interferometer/spectrometer; and two television cameras.

The Varian 6221 has been integrated into the Sose system in what JPL calls the Computer Controlled Science Payload Test Set (CCSPITS). It will be used for decommutation, which resolves data coming in on a bit-stream that is serial but has to be taken out of a particular "slot" and put into another "slot" so that analysts can examine it.

Other functions of the mini are data from the test experiment with the true data from the data automation system; for driving displays; and to test procedures that will check critical functions of the entire scientific payload prior to the launch.

TTY Net Controls Food Storage Site

KANSAS CITY, Mo. — A nationwide data communications network controls most aspects of an underground food storage facility here.

Inland Underground Facilities, a division of Beatrice Foods Co., moves eight million pounds of food daily in its 100-acre below-ground warehouse.

This in-transit storage point is linked to Inland customers — food processors, distributors and retail clients — through a network of Teletype terminals.

Customers communicate directly with Inland's computer on a real-time basis, obtaining quick responses to inquiries about stock quantities, order processing and shipments. Another advantage reported in the case history is reduction of billing time from days to hours.



RCA programmer sets up a test program in a Varian 6221 general-purpose digital minicomputer at Jet Propulsion Laboratory in Pasadena, Calif.

Drafting Unit Helps Cut N/C Costs

TULSA, Okla. — The Tulsa division of North American Rockwell uses a Gierber computer-controlled automatic drafting machine for numerical control (N/C) tape production and verification.

The division said the system helped to keep the average cost of N/C tape production for in-house operations below the industry average.

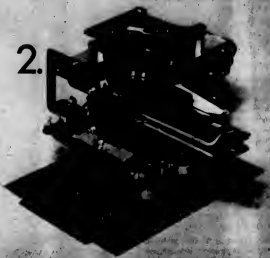
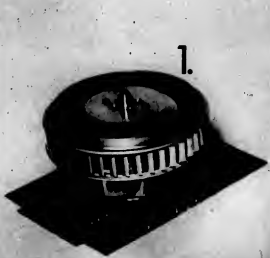
The system, consisting of a stored program, 2000 control with 8K core memory, a large, high-speed flat-bed drafting table, and automatic optical line follower is also used for tool design and consultation.

To eliminate costly machine proofing of N/C tapes, the division verifies tapes using the precision drafting machine.

Preprogrammed N/C tapes can be plotted in XY, YZ, and ZX axes to determine the accuracy of the geometry and motion package.

The drafting table is equipped with a cutter simulator head, and a six-in turret, to simulate the actual cutter diameter, as well as to draw the cutter centerline, allowing for overlays of the original plot. This determines whether will material to be removed has been machined off in the program.

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and up to 100,000 Repairs and Replacements to Diablo's

Account Identification Plan Has Unusual Numbering

CHICAGO — Sears, Roebuck and Co., the world's largest retail distributor of consumer products, recently adopted an account identification system for its computerized accounts payable department which has saved time and money and helped make records more accurate.

The Data Universal Numbering System (Duns) is supplied and maintained by Dun & Bradstreet, Inc.

According to H.I. Salsbery, an assistant to Sears' National Catalog Order Controller, when the company changed from manual to computerized account handling, one of the biggest problems was to find a numbering system for vendors which would not become outdated or inoperative.

At first, numbers were assigned internally from each of the five accounts payable centers. But when these numbers became unwieldy, Sears started to look for

a universal numbering system.

The system was recommended to Sears by the National Retail Merchants Association (NRMA), which had endorsed the system and requested members to use it.

"When we learned that the system is designed for continuous additions of new accounts and is compatible with all types of electronic data processing equipment, we decided to see if it would help solve the problems associated with our new operation," Salsbery said. The system includes the complete DAB business files in a continually updated data bank of almost three million establishments.

How It Works.

A unique, random 9-digit number sequence (for example,

00-050-0108) is assigned to each establishment. The high-order position, or the very first of these digits, is a zero to allow for future expansion.

The last digit to the right is a check digit and gives a computer, or other equipment with a specialized feature, the ability to check whether a given number is valid or contains an error such as a transposition.

It is the answer to a simple arithmetical manipulation: the machine is instructed to perform using the other digits.

A "user block" of numbers from 00-000-000 through 00-099-999 has been reserved for the individual use of subscribers. These numbers may be assigned internally to any account not yet covered in the system.

The random quality of numbers insures that the system will not become outdated as will systems based on alphabetical orders.

Salsbery listed the following benefits of the Duns system: "First we've reduced our clerical lookup time. Once we have assigned a vendor his Duns number, the processing work is done automatically by the computer.

"Second, we process approximately 1.5 million invoices a month from five different accounts payable centers for goods and services, contractors, installers and so forth.

"By giving each establishment its own, unique number, we have reduced the possibility of sending money to the wrong company." Such errors occurred under the previous system when

companies had the same or similar names.

"Third, we can record in a manageable way all the information we need for our remittance advice which is sent along with our check to tell the vendor what documents he is being paid for. This information includes, among other things, transaction codes, the number of our store that received the merchandise, document number and amount.

"We have fewer mistakes now that the Duns number is identifying each company and helping to reduce clerical errors," he said.

And Sears may find another use for the Duns number. Salsbery reports the company is planning to convert its purchase order department into a computerized operation.

Drafting Plan Aids Australia Road Building

QUEENSLAND, Australia — The Queensland Department of Main Roads is currently utilizing an automatic drafting system to build a better highway system for Australians.

The Gerber 622 system, one of the first of its type in Australia, is being used in conjunction with the department's new \$700,000 computer complex.

Department officials said the system is expected to make major contributions to road safety by preparing perspective views of blind corners and other road visibility problems that are actually experienced by motorists.

By providing Main Roads Department engineers with a visual record of the road's finished design and alignment based on initial plans, the system can facilitate design corrections long before construction begins.

The department also plans to use the equipment to prepare maps of traffic density in various areas to allow greater accuracy in establishing future road needs and construction programs.

In addition, the system is expediting the performance of a variety of other functions such as graph plotting, contours, road surveys, cross sections, and profiles of roads.

The Queensland Minister for Main Roads said that apart from providing numerous benefits to all Main Roads activities, the system would be particularly valuable for work on the \$66 million first state freeway scheme for Brisbane.

The 622 is a combination of Gerber's Model 22 general-purpose flat-bed drafting table and its Series 600 control.

Controlled by specially developed Gerber software, the system is capable of speeds up to 600 in./min and can attain accuracies of ± 0.005 in. with repeatability of ± 0.003 in.



Software Is a Major Problem in Distribution Systems

By Peter L. Briggs

Special to Computerworld

With the advent of inexpensive, flexible, readily available mini-computers, it has become possible for users to examine their computer operations from a different light — should computers be centralized or decentralized? When data processing first became used in business, companies had the equipment, generally card handling equipment, spread throughout their companies. If one area used a card sorter, another a keypunch, others accounting or printing units, then the appropriate devices were located where they were needed.

Central processors, a comparatively recent development, brought the cost up to levels where companies could not af-

ford to have several such machines. The user was forced to centralize his operations around these larger central processors and their associated peripheral equipment.

Along with this centralization came the development of large data storage devices like drums, disk drives, and tapes. These devices further locked the user into his central site, because he had to have these units reasonably close to his central processor, and he had to maintain libraries of tapes, disks, etc. that were convenient to these peripherals.

When terminals became available, users recognized the potential for distribution of work among the areas where it was needed, but found that terminals, though sometimes help-

ful, were simply not powerful enough nor were they oriented to the kind of work needed.

Terminal Growth

Terminals continued to become more powerful, attained processing capabilities, and began to do some of the actual work at the terminal rather than strictly functioning as a communications and input device.

Minicomputers have changed both the nature of terminals and the potential nature of data processing. It is now possible for users to incorporate both the processing power and the communications handling directly into the same box with the terminal.

The price dropped out from under minicomputers early this year, and a user can now pur-

chase an 8K-core mini with variable microprogramming for about \$10,000-\$12,000. Combine this with a terminal and the price goes up to about \$15,000. This combination, when properly programmed, can handle local I/O, printers, card readers, communications, data editing, and limited data processing.

Various special random memories permit at the terminal local data storage and retrieval. Though this storage is not huge, it is large enough to permit handling of payroll files for, say, 500 people, or an inventory for about 1,000 parts.

Thus, for small applications, the terminal becomes a stand-alone processor and can be run offline. For applications requiring either large data files or heavy computational loads, the

terminal communicates with a larger processor at a central location.

This concept can be extended, and probably will be before 1974, to eliminate the central processor for computational work. If sufficient power can be built into local processors, and it were possible to link several of these local processors together in a network, then they could handle the processing work by breaking it down into smaller pieces.

Software Problem

A serious problem arises — software. Very little work has been done on resource management and allocation in a multiprocessor environment. Most of the available multiprocessor systems use very primitive algorithms which allocate one processor to the front end for the other processor. A 360/50 will handle communication and I/O for a 360/65 and so on.

The problem, then, is to devise means to control the many components of a large distributed system such that when computational power is required for specific problems, several processors can be searched until enough free-ones are found to do the work.

The problem must be analyzed and broken down into its components, and the processors scheduled for synchronized work. When the particular problem is complete, then the processors must be released for other work. The theoretical problem has not even been adequately defined, let alone had a solution implemented.

Such resource management cannot be handled by conventional stochastic techniques, where if all the factors describing a current situation are known, it is possible to predict the next sequential operation.

There is simply no way to predict what requirements will come next. New technology must be worked out to describe the problem symbolically, then people must take this description and turn it into a working system.

Distributing the processing capability only solves half of the problem. The other is data. Terminals in a distributed system can store limited amounts of information. Somewhere, there must be a central data bank that services all the members of the distributed network.

In any case, until both the software to handle distributed resource allocation and the central memory bank with unlimited capacity become available, it will not be practical to institute distributed systems.

Peter Briggs is an independent consultant.

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Mini Controls Huge Pipeline

COALINGA, Calif. — One of the longest and largest heated crude oil pipelines in the world is using a minicomputer as part of a solid-state supervisory control system at its point of origin here.

The 174-mile, 20-inch pipeline moves about 112,000 barrels per day of heavy crude oil from the San Joaquin Valley to refineries in the San Francisco Bay area. A Varian 620H, hardwired to the telemetry system and programmed for several functions throughout the length of the pipeline, is used to ensure control of operations.

One of the mini's principle functions is to monitor safety factors. The computer scans 250 status and alarm points every 16 seconds; it can initiate status data printouts on demand or every hour, and prints out alarm data, critical temperature and pressure upon preselected significant



Communications technician for Getty Oil Co. observes supervisory control console for crude oil pipeline in San Joaquin Valley.

change levels. The unit also calculates line segment differential pressures and temperatures for strip chart recorders located here at the central Coalinga supervisory point.

The use of the minicomputer — and the entire supervisory control system in general — brings important safety to the pipeline operation and reduces the number of man-hours required to visually check each critical parameter.

University's 'Do it Yourself' Lab Is Popular Place for Research

PITTSBURGH — Trying to determine how to prevent a river from drying up, monitoring the electrical activity of the brain, and learning more about how the heart functions are but three of the variety of activities taking place in Carnegie-Mellon University's do-it-yourself hybrid computer laboratory.

The computer system is a DEC PDP-9 medium-scale digital computer interfaced to a medium-scale Electronic Associates Inc. analog computer.

Carnegie-Mellon researchers in electronics, medicine, chemistry, physics, civil engineering, and as many other disciplines as there are at the university make use of the laboratory at all hours of the day, according to the manager, Joseph Johnston.

The PDP-9, through an analog-to-digital

converter interface, was recently used as a data acquisition system, gathering information from the analog computer and allowing an engineering team a device for mathematical calculations.

Medical researchers at Carnegie-Mellon have used the hybrid system in signal averaging in electrophysiological studies. A portion of the brain of a subject, is stimulated, the analog computer is used to gather information on the electrical activity of the brain brought about by the stimulation. The information is then collected on the PDP-9 through the analog-to-digital converter and pictures of the brainwaves are automatically produced on a plotter connected to the PDP-9.

The system can also be used to move information from the PDP-9 to the EAI computer to output information on CRT displays and strip charts.

Satellites Located, Camera, Telescope Aimed by Computer

CLOUDCROFT, N.M. — To gain new knowledge in the expanding field of electro-optics, U.S. Air Force and civilian scientists here are photographing distant satellites in orbit around the earth with highly complex electronic equipment, an IBM computer, a 48-in. reflector telescope and a camera that takes 200 photographs a second.

Photographing is done at night, when sunlight reflects from the passing satellites.

Capturing the image of a passing satellite requires hours of preparation for a



A civilian technician is dwarfed by a giant telescope at the U.S. Air Force Electro-Optical Facility.

photographing session that lasts only 20 to 40 seconds — the time it takes a satellite to streak from one horizon to the other.

Marksmanship must be very precise. To aid in tracking a distant satellite as it races across the sky, the team uses an IBM 1800 data acquisition and control system which keeps the giant telescope constantly aimed at the moving space vehicle. The same computer also will be used soon to unblur satellite photographs distorted by the earth's atmosphere.

The path of a satellite is calculated in advance and fed into the computer, which then determines the timing and rotations required to keep the giant telescope aimed precisely at the satellite from the moment it comes into view until it disappears.

The computer also monitors the entire operation during a shooting and prints mathematical data used later to analyze a satellite's orbit.

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Research Lets Viewer Step Into Drawing

SALT LAKE CITY, Utah—New computer graphics techniques being developed at the University of Utah may someday permit architects to draw buildings in three dimensions and visually step into the drawing. They may then view the building from the inside by using an exotic head-mounted display device. The same research may enable prospective homeowners to see the interiors of houses on display screens without leaving the realtor's office, according to David C. Evans, chairman of the university's computer science department.

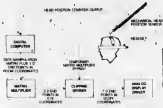
Evans said the innovations are part of a research program designed to simplify the exchange of information between people and computers by using pictures.

To do this, a large DP system with interactive graphic capability uses two Digital Equipment Corp. central pro-

cessors with common DEC core storage.

Three Ampex RG core memories provide extra on-line storage for both processors, maintaining a large, quickly accessible data base file.

New data can be processed rapidly by the DEC units and transferred to the appropriate Ampex memory level for retention or for immediate access, according to Evans.



Illustrated is the function of the head-mounted display device used in computer graphics research.

ing to Evans.

A wide variety of equipment permits computer-generated perspective images to appear three-dimensional when viewed with a head-mounted device suspended from the ceiling.

Created by Dr. Ivan Sutherland, University of Utah, the device in effect makes the viewer's head a "camera" and each eye a "lens."

In each eyepiece is a tiny CRT, like a miniature television screen, on which the computer image is projected. The optical system then projects a virtual image of the object shown on the CRT at a point approximately 18 in. in front of the viewer's eye.

The image seems to be suspended in space all around the viewer, and it changes as the viewer moves his head.

He can actually see the interiors of properly designed drawings and move in and out, back and forth, side to side, like a television camera, to get a better view



The head-mounted display device enables the viewer to visually "step inside" computer-generated, three-dimensional objects.

of the objects that "surround" him.

To appear three-dimensional, the perspective image need only change with the movements of the viewer's head. The coordinated head and image movements create the three-dimensional illusion.

Tape System Monitors Flights

DORVAL, Quebec, Canada—A small, computer-based tape playback system is helping Air Canada obtain detailed profiles of flights of their DC-9 and long-bodied DC-8 aircraft.

The computer, a Digital Equipment Corp. PDP-8/L, is the heart of a system made by Leigh Instruments, Carleton Place, Ontario, that plays back the tapes taken from the aircraft's in-flight recorders.

The recorders monitor over 50 different signals, ranging from altitude, airspeed and engine fuel flow to the position of the flight controls, the aircraft's heading, and its altitude. While these measurements are useful if the airline wants to run studies of turbulence, or measure some of the performance characteristics of the plane, the in-flight recorder's main use is to give the airline information concerning a plane's performance before, and during, an accident.

The incoming signals are recorded on a continuous loop of magnetic tape that can record for 106 hours. The tapes are removed after about 1,000 flying hours to be sure each sensing circuit is operating properly.

The capsule in which the flight recorder is stored is located in the tail section of the plane, and can withstand 1,000 times the force of gravity and, for up to 30 minutes, temperatures of about 2,000° Fahrenheit, compared to copper, which melts at about 1,062° Fahrenheit.

Petroleum Analyzed Over Long Distance

SAN ANTONIO, Texas—Researchers at Southwest Research Institute are using a CDC 6400 in Kansas City to analyze petroleum samples. A Data Graphics Corp. DGC-300 Data Transfer System takes the output from a fluorescence spectrophotometer and passes it to a remote time-sharing terminal.

The petroleum sample is measured by a scanning spectrophotometer which gives an output of fluorescence intensity relative to wavelength.

The DGC-300 interrogates the spectrophotometer at a preset rate, and loads the results in memory. When the terminal is ready, it signals the DGC-300 which then passes the data to the terminal and on to the computer.

The computer has on file an analysis program which takes the data and compares it to known values. The computer then reads out the results via the terminal. This gives the research personnel the necessary "feedback" so they can adjust their experiment as needed.

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Empire State System Monitors Air, Water Pollution

NEW YORK—Can a computer help clean up the Hudson River? Can electronic sensors be used to bring cleaner air to Buffalo? Is electronic data communication and processing a key to solving New York's pollution problems?

The New York State Department of Environmental Conservation and Department of Health strongly believes the answer to these questions is "yes." It is so convinced, in fact, that it has begun implementing an automatic air and water monitoring system that is among the most advanced in the world.

The new system, called the Empire State System, provides for the automatic electronic monitoring of air and water conditions in the state, and the rapid transmission of the monitored data to a Burroughs B3500 computer at Health Department headquarters in Albany for storage, processing, evaluation and reporting.

As a result, Environmental Conservation

officials are provided with almost instantaneous warnings and information on excessive levels of pollution so that appropriate measures can be taken.

In addition to the Burroughs B3500 computer, the system's essential elements include 12 water monitoring stations and 11 air monitoring stations at critical sites around the state; a remote information center, in the Department of Environmental Conservation in Albany, which is used to receive alarm information from the computer, to call the computer or the monitors for additional information, and to transmit functional commands to the monitors; and a telecommunications system which transmits the data among the monitors, the computer center, and the remote information center.

The water monitoring stations, which are unmanned, are equipped to provide automatically comprehensive information on how the monitoring equipment is functioning.

Many possible malfunctions can be corrected almost immediately by Environmental Conservation personnel or by the computer, through the use of functional control equipment. This equipment provides the capability to even activate burglar alarms or turn off lights at unattended monitoring stations.

The actual data acquisition process of the system operates in the following activity sequence:

The B3500 computer, which maintains a schedule of monitoring station telephone numbers, automatically polls each air station once every 15 minutes and each water station once every hour.

When contact has been established, the computer instructs the station to transmit the latest data on air or water characteristics, as well as a status report on operating conditions at the monitoring station.

After the message is received by the Burroughs B3500, the computer edits the

message, sends any necessary functional commands to the monitoring station, and then disconnects.

The edited information is compared to acceptable environmental limits and if preset criteria are not met, the computer sends an appropriate alarm message to an input/output device at the office of either the air resources or pure water divisions of the Department of Environmental Conservation.

If necessary, the computer can be directed to call a station out of sequence and repeat the appropriate steps as often as required. Regardless of an alarm condition, the computer stores the edited message on a direct access device for later daily processing. The computer then proceeds to the next station in its polling sequence and repeats the steps above.

Once each day, a complete system activity report is prepared for the air resources and pure water divisions. At the same time, the data collected from all of the stations is encoded on magnetic tape for further analysis and more comprehensive reporting.

Harold Gottlieb, director of electronic data processing for the State Department of Health, said: "In addition to making as many as 60 calls an hour to monitoring stations, our B3500 is used in three major remote data communications systems: maintaining a blood bank inventory for hospitals in the Albany area, matching donors and recipients for kidney transplant operations, and calibrating equipment used for the detection of radiation.

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- ☐ Put me on your mailing list for information about your products and services.

Name _____	Title _____	Phone _____
Organization _____		
Address _____	Zip Code _____	

DP Nets Company Double Benefits

OWATONNA, Minn. — Josten's, a large manufacturer of scholastic products, has developed a computer-based system which has netted it double benefits for its data processing and typesetting operations.

The system combines a five-disk Inter-type Fotodisk, a 1200-phototypesetting machine; a Honeywell 1230 computer;



Josten's DP Center

and Mohawk data transmission/receiving terminals and automatic tape input machines.

The scope is nationwide, encompassing Josten's graduation announcements divisions in Telford, Pa.; Shelbyville, Tenn.; Portersville, Calif.; and its graphic arts division and DP center in Owatonna. The typesetting supplier, Jaggar-Chies-Storval, Inc. (JCS) is also linked with the other divisions.

Each division has a Mohawk 1103 data transmission and receiver unit and a battery of Mohawk 1101 automatic data recorders for tape perforating. Orders are key-boarded and the tapes transmitted to the DP center at Owatonna using the 1103s. One record is generated per student order.

The computer prints out the appropriate information for all necessary forms—mailing labels, shop tickets, invoices, customer lists, etc. The information is coded alphabetically to include such data as type style, size, and color.

At the same time, this information is merged with typesetting instructions to produce tapes which are mailed to JCS to be fed directly into the Fotodisk 1200.

Ralston Saves \$2,200/mo in Line Charges With Time-Division Multiplexing System

ST. LOUIS, Mo. — The Ralston Purina Co. has an internal multiplexing system operating over a single 4-wire twisted pair cable that saves the firm \$2,200 a month in line charges.

The Multitran system, supplied by Computer Transmission Corp., is a time-division multiplexer that gives Ralston the capability of high, medium- and low-speed intermixing with maximum system flexibility.

Ralston's computer center, housing an IBM 360/65, is on the second floor of the administration building. On the first floor of the same building, programmers assigned to basic incorporated functions such as payroll, accounting, etc. use a 2780-type RJE terminal operating at 4,800 bit/sec for convenience input. This terminal is now being used for remote testing of various software applications.

One block away, the new Tower Building has two 2780-type, 4,800 bit/sec RJE installations. The first is employed on the 14th floor by

programmers assigned to the agricultural products group; the other is on the fourth floor and is used by the programmers of the consumer products group.

Soon, a second CRT Controller will be installed on the tenth floor, where the pricing department will use its CRTs for direct entry of weekly product price revisions. This will be the first implementation of the software now being tested.

Without multiplexing of any kind, this communication system would normally require two data sets and one line for each terminal installation, whether they are some distance or only a few feet away from the CPU.

This system as described would typically be configured to in-

clude five standard voice-grade lines at \$40/mo each and ten 4,800 bit/sec. modems at \$200/mo each, for a total of \$2,200/mo.

The line costs have been eliminated by the incorporation of private 4-wire twisted pair facilities into the Ralston Purina system, but the cost and bulkiness of the 10 data sets were sufficient to discourage the data processing management of Ralston. Purina from taking this standard communications approach.

Standard EIA connectors are mounted on the rear of the Multitran for plug-to-plug compatibility with any 4,800-bit standard EIA interface terminals.

UNUSUAL ? YES !

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Italy Tackles Tunnel Traffic

NAPLES — No European country or city has quite the same trouble with traffic flowing through tunnels as does New York City.

But many of the tunnels, such as the Autostrada di Italy, are in high-speed motorways and some are immediately before national frontiers, or toll barriers.

The San Fermo tunnel on the Milan-Roma-Chiasso motorway combines all three disadvantages and the Italian engineers have tackled these problems in a number of ways.

An electronic system is used to detect a stationary vehicle or line of vehicles by means of hop detectors of the infinite presence type, which provide an output as long as a vehicle is over the roadway loop.

These detectors are spaced 80 meters apart in the 700-meter long tunnel.

Whenever a time threshold for passage between the detectors is exceeded, the control systems automatically turn to red the control signals outside the tunnel.

The control computer keeps the input signals at red as long as any detector loop is occupied. When blocking signals cease to be received the entry lights to the tunnel are turned to green after a predetermined period.

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Measuring Device to Aid Black Lung Disease Research

BRUCETON, Pa. - Physicians at the U.S. Bureau of Mines, Pittsburgh Energy Research Center are using a Digital Equipment Corp. PDP-12 to design a portable instrument for use in the measurement of mine coal dust concentrations causing "black lung" disease.

According to research director Richard Corey, the new instrument will be small enough to fit in a portable case, which the safety engineers and inspectors will be able to carry right into the mines.

"Up to now," according to Dr. Sabri Ergun, who heads the re-

search team, "no satisfactory method has been developed for determining the instantaneous size distribution of the dust and its variation with time and location in the mines.

"We are concerned with the particles that are trapped in the lungs and threaten the human

system. We want to know the concentration of respirable dust, its variation with time, location, and mining methods."

To accomplish the analysis, Ergun's group has designed and constructed an aerosol spectrometer for laboratory use as a precursor of the prototype portable monitor. The monitor utilizes the principle of light scattered from a laser beam by individual dust particles.

The spectrometer consists of a helium-neon laser, a hemispherical silvered reflector, which focuses the scattered light to be detected by a multiplier phototube, and associated electronics consisting of a preamplifier, amplifier, and single channel analyzer.

The electronic pulses generated by the passage of dust particles through the sensing zone of the spectrometer are shaped and the



Dr. Richard Schöhl, a research physicist with the U.S. Bureau of Mines, checks out the computer system before making a test run.

PDP-12 system performs analog to digital conversion of the pulse height.

Australia's First Digital Traffic Control System Installed at Paradise

CITY OF GOLD COAST, Queensland Australia's first digital traffic control system has been installed recently at Surfers Paradise. This is Australia's best known tourist area and subject to the seasonal variations typical of such centers. It handles at peak well over 30,000 incoming cars per day, and this number is increased by 15% by internally circulating traffic.

The system is based on a Honeywell DDP-516, 10K core, computer interfaced to local control-

lers. Buried loop vehicle detectors are also used. Special hardware features allow for takeover of control by the local controllers in the event of power failures on a fixed time cycle basis.

The system is coded in assembler DAP 16, and it took 12 man-months to design and 12 man-months to program. It consists of eight independent programs, comprising a total of 1,500 words, which are permanently resident in core.

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November 18, 1970

Page 51

CI Notes

Commerce Exhibit in Japan Seen as Smashing Success

TOKYO—Initial reports from the recent U.S. solo exhibition of computer equipment here indicate that the show was a "smashing" success.

The crowds were "tremendous" in the words of one exhibitor, and most of the visitors "meant business" in the words of another. Outright sales on the floor of the show were said to amount to \$2.3 million and the Commerce Department predicts that over \$40 million in sales will be made in the next year as the result of the show.

Cogear 4 System Expected At Beginning of Year

WAPPINGERS FALLS, N.Y.—The previously disclosed Cogear Corp. entry in the field of key-to-cassette units (CW, Nov. 4) will make its debut around the first of January and not this week as previously reported.

The unit, called the Cogear-4, will rent for around \$10/1mo and carry an overall price tag of about \$7,500. The device reportedly will offer several "innovations" over previous key-to-cassette data capture devices.

Facit-Ohdner Sets OEM Marketing Department

SECAUCUS, N.J.—The demand for EDP components for original equipment manufacturers has led to the establishment of a new department by Facit-Ohdner, Inc.

Facit products for OEMs will now be marketed by a newly organized OEM Components Department headed by Anders Lundgöhl as national sales manager.

Facit products for the OEM market include tape punches, recorders, readers, keyboards, and other vital components.

Information Lands Call Contract
CANOGA PARK, Calif.—Informatics, Inc. has received what is believed to be the first Call Contract ever issued for a computer software product from the U.S. Government.

This governmentwide contract, negotiated by the Electronic Systems Division of the Air Force Systems Command, outlines for all federal agencies and departments the terms, conditions and prices for the acquisition of the Mark IV File Management System.

The Mark IV File Management System is used with IBM 360 and RCA Spectra 70 computers. Government sources indicate that approximately 350 of these computers of an appropriate model are installed within the Federal Government.

SDC Enters Europe Through Gemini Deal

SANTA MONICA, Calif.—System Development Corp. (SDC) has signed a computer software marketing agreement with Gemini Computer Systems, Inc., of Paris, one of Europe's largest software firms.

Under the terms of the agreement, Gemini, associated with The Diebold Group, will represent SDC in the sale and leasing of proprietary software packages and contract software opportunities in Europe.

Industry Influence?

Blue Ribbon Panel Hit by DoD Critic

By Alan Drattell
CW Washington Bureau

WASHINGTON, D.C.—An ad hoc of Pentagon-purchasing policies has questioned the possible role of computer manufacturers in influencing the Blue Ribbon Defense Panel report issued this past summer which suggested reorganization of the automatic data processing setup within the Department of Defense.

A. Ernest Fitzgerald, in an article in the November issue of the *Washington Monthly* magazine, said that "the com-

puter industry, which needed new business, was collectively furious" at the changes in ADP procurement and utilization that had been initiated by Col. Joseph B. Warren, deputy controller for data automation in the Office of the Secretary of Defense.

The solution, according to Fitzgerald, was reorganization "using the Fitzhugh report as a vehicle. And the report did recommend reassessing responsibility for Joe Warren's function to a civilian assistant secretary, citing procurement delays

as a major problem.

"Interestingly, even though the report acknowledged low equipment utilization, the possibility of over-buying [of equipment] was not even discussed," Fitzgerald added.

'Fitzhugh Panel'

The Blue Ribbon Panel is often called the Fitzhugh Panel, for its chairman Gilbert Fitzhugh, chairman of the board of Metropolitan Life Insurance Co. The panel was formed to look into the organization and operation of the Department of Defense (DoD) and to make recommendations for streamlining it.

Fitzgerald is a former \$3,000/yr Air Force cost efficiency expert fired from his post when he "blew the whistle" on cost overruns in the C-5A transport plane program. He says he was assisted at the time by Warren, then in the AF Systems Command, who "was perceptive and fearless enough to write and sign the first report which stated bluntly that the C-5A was a disaster."

Shortly after disclosure of the C-5A report, Warren was reassigned to be air attache in Addis Ababa. In fact, he had asked for assignment as air attache in Taiwan, but when he was notified that his base would be Addis Ababa, he sought a different assignment. It was then that he was able to get his present post, with the aid of friends, in DoD.

In his ADP management position, Warren found computer utilization to be under 50%. The Fitzhugh report estimated it at better margins, at 60%, and, according to Warren, "an analysis of the Blue Ribbon report on computer utilization shows the report was ridiculous and shallow."

The colonel also changed justification procedures for equipment buys, blocking acquisitions of equipment when he thought the justifications to be poor.

Ampex Plans \$16 Million Sales Of IBM Replaceable Core Units

CULVER CITY, Calif.—A segment of the computer peripherals industry that didn't exist 18 months ago may result in more than \$16 million worth of new equipment shipped this fiscal year for Ampex Corp., the company said.

Large capacity, quick access core memories are winning acceptance as plug-to-replace IBM large core store (LCS) 2361 units used with IBM 360/50, 65, 67 and 75 systems.

Since installing the industry's first LCS replacement unit in mid-1969, Ampex has installed 30 ECM extended core memories in the U.S. and Canada.

Eugene E. Prince, vice-president, general manager of the Ampex Computer Products Division, said Ampex ECM units have enabled IBM users to either reduce costs or increase throughput or both. He said other independent peripheral suppliers are just now entering the IBM core memory replacement business.

The ECM, with one million bytes of core storage, has a purchase price of \$289,000.

The IBM 2361 LCS unit's cycle time is 8 μ sec. Cycle times for the Ampex ECMs, numbered for the 360 models they serve are 4 μ sec (ECM-50) and 2.8 μ sec (ECM-65, -67, and -75). Up to eight ECMs may be linked with one 360 system without modifications, Ampex said.

Two Approaches

Prince said users have taken two approaches, or a combination, to improve efficiency with the Ampex ECM.

• Shifting major core memory work from main memory storage to less expensive extended core storage, en-

larging total storage while saving money.

• Installing one or more ECMs (at one million bytes each) as replacements for or instead of IBM 2361 units.

"The market's response to the ECM series is surpassing our original plan," Prince stated. "We are now producing ECMs at the rate of two per week."

He cited the price/performance ratio, the memory's reliability, and an expanded Ampex end-user service organization as factors contributing to the market response.

The ECM is enabling users to upgrade their systems and either save money or keep costs the same while doing it," he said, "a very popular situation in this time of tight money."

Users of Ampex extended core memory range from time-sharing companies to university research activities to industrial corporations, and include Dialog Computing, Inc., Phi Computer Services, Rand Corp., Boise Cascade Corp., the universities of Southern California, Hawaii and Waterloo (Canada), and Cornell University.

By Michael Merritt

CW Staff Writer

WHITE PLAINS, N.Y.—As of the beginning of last week the Service Bureau Corp. has refused to accept contracts for custom programming for other than SBC service customers.

The change in policy involves the "relaxation" of some 200 programmers according to an informed source.

It also means dropping a business that provided SBC with an estimated \$10 million in revenue.

According to an SBC representative, the change was made so that SBC could "more actively pursue other areas of its business." SBC emphasized that it would continue to honor contracts in force and would also continue to support SBC customers by continuing to write custom programs to be run on SBC machines.

"We're not going out of programming," the SBC spokesman said, "and we will continue to support users of time-sharing and traditional service bureau work."

He noted that affected employees and customers have already been informed of the drop.

The spokesman also said that "every effort" is being made to relocate employees within IBM.

Service Bureau Corp. Drops Race for Contract Programs

The service, known variously as contract programming, mobile programming, or service and programming applications, apparently worked out of four offices, New York, Washington, Dallas, and Los Angeles.

There has been speculation by industry sources that SBC has been having a year 2, as it is at better margins and profitable. Custom programming, because of SBC's high prices, has been easy pickings for competitive software houses, according to one source.

While SBC is an IBM subsidiary, and IBM does not break out SBC's financial figures, International Data Corp., a market research firm, has estimated SBC's 1969 software sales at \$35 million, enough to make it the largest software vendor in the country. Its closest competitor, according to IDC, is Computer Sciences Corp. with \$26 million in 1969 software sales.

The change in policy was effective Nov.

There has also been industry speculation that while SBC may be pulling in its horns, some of the contracts may simply move to a different set of books and be taken over by IBM SA.

Data Spritz

Secretary "launches" a Stromberg Datagraph 2522, its first production model phase encoded tape drive.



'Parts' Meets Military/Industrial Publication Specs

RYE, N.Y. — Manufacturers faced with technical publication requirements imposed by military services and specialized industrial markets can use the Parts Analysis Reporting Techniques and Systems (Parts "network" of programs from Datasphere Systems Corp.

According to Datasphere, Parts is designed to handle the creation, updating and publication of technical data pertaining to both electronic and mechanical parts and equipment.

The "network" consists of three basic

units: the Data Storage and Retrieval System (DSR); Database Operating System (DOS); and Report Generating System (RGS). While the logic in the DSR and DOS units is standard for all implementations of the Parts network, RGS is modular, and includes subsystems designed to generate the reports and punched card decks required under specific military specifications.

Specifications covered by current RGS subsystems include the Illustrated Parts Breakdown System (MIL-M-8910), and

two Provisioning Systems from DoD (AFLCM310-1 and WR-1). Coding is also available for Ecom Provisioning System (TM38-715) and the Ecom Repair Parts and Special Tools List.

The Illustrated Parts Catalog System (ATA-100) and Provisioning System (ATA-200) are also supported by modules under the Parts RGS.

Datasphere said that military specification subsystems will interface with any bill-of-materials processor or with the Parts DSR. The latter is structured around a master file containing data about each part in the manufacturer's entire inventory of parts.

This master file is used to generate the end item file for each piece of equipment, including data on component parts and their interrelationships, organized to serve as the database for a particular RGS subsystem.

Datasphere's DOS performs file maintenance functions with the master or the

end item files: posting of input entries after validation against established criteria; updating of the files through additions, corrections or deletions; resequencing or sorting of the files; and selection or retrieval, by item or group of items.

The company said that the Parts "network" of programs is written largely in Cobol, with some segments in BAL. It has been implemented on a 360/30 with 65K storage, under either TOS or DOS.

Cost of the system depends upon the RGS subsystems required but would be approximately \$12,500 to \$15,000 for a system using only the MIL-M-8910 logic. The cost includes field installation, maintenance, instruction, manuals and updates to the system for one year in case of changes in the specifications by the requiring authority.

Datasphere Systems Corp. is at 41 Theodore Fremd Ave.

Alden 600 Recorder Produces Hard Copy From Graphic CRTs

WESTBORO, Mass. — The Alden 600 Push to Print Recorder, intended for OEM use, provides instant graphic hard copy paper records from data and graphic CRT display terminals.

Utilizing the Alden Flying Spot facsimile recording technique, CRT recordings can be generated on Aifax electro-sensitive paper at 30 line/sec, which equals a 600-line frame/20 sec or 800-line frame/30 sec.

Recordings are instantly visible, eliminating the need for further processing, the company said. Supplies cost less than 1 cent/frame.

Simple interfacing requirements make the recorder suitable for use with all graphic data display terminals, according to Alden.

The unit is supplied with synchronous drive motor, sweep trigger output pulse and internal marking amplifier.

The customer interfaces the unit to his XY sweep generator and provides a CRT target read amplifier.

The Alden recorder uses a standard 170-ft roll of 6 in. wide Aifax Type A Hi-White recording paper. Standard 360° helix records 5.8 in. sweep length. Standard sweep speed is 1,800 RPM (30 sweep/sec) and 100 line/in. paper advance. Nominal spot size is .010 in.

The price of single units is \$1,980. In lots over 100, the unit sells for \$925, and is available from stock.

Xerox's McCough Delivers Support For Electronic P.O.

WASHINGTON, D.C. — "The technology now exists to afford high-speed facsimile transmission of mail through a complex digital data transmission network that will link sender to receiver," according to C. Peter McCough, president and chief executive officer of Xerox Corp. and co-chairman of the recent Fourth National Postal Forum.

McCough's remarks came in a speech which envisioned "electronic mail boxes" located in homes and offices to speed correspondence. He talked to some 3,000 delegates from industry and government who attended the two-day postal forum.

McCough contended that the new postal service, created by President Nixon this past summer as part of postal reform, must get away from the vision of mail handling as the transmission of objects, and begin to regard it as "the transmission of information."

"When we take this approach — when we examine the problem in its systems context — we can see that much of this information could be transmitted electrically for instant machine regeneration."

"The technology exists. All that remains is our need to recognize the kind of problem we are really solving; a problem in information transmission, not a problem in mail handling," he added.

Alden Electronic & Impulse Recording Equipment Co., Inc. is at the Alden Research Center.

Computer Microtechnology has ROMS, RAMS, and REGISTERS

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BIPOLAR AND MOS/LSI

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'Fight for Survival'

CPMA President Outlines Association's Stand on IBM

WASHINGTON, D.C. - In recent weeks the Computer Peripheral Manufacturer's Association (CPMA) has charged IBM with design practices aimed at eliminating competition from independent peripheral manufacturers.

While IBM has remained mum on the charges, a great deal of confusion has arisen over the CPMA position. To alleviate that confusion, the association president, L. Richard Caveney, has outlined the answers for what CPMA claims are the most common questions.

The following was prepared by the association to answer those questions.

Q. - CPMA recently leveled a charge that IBM appeared to be following a program of design for new systems and computer peripherals that would eventually eliminate the manufacturers of plug compatible peripherals. Has there been any response from IBM?

A. - The only response we've heard to date has been indirectly. That was "no comment."

Q. - What will CPMA's next move be?

A. - We are going to discuss this further with the National Bureau of Standards in Washington, D.C., and the appropriate congressional committees. We also plan to seek counsel from the Justice Department and will provide them with all the information concerning this issue.

We will push in every way possible to reverse the present design trend; that appears to be what IBM is pursuing; after all, this is a fight for survival.

Q. - Specifically, what policy is CPMA proposing to reverse this trend?

A. - We are asking that all future computer systems be architected so that there is a clear definition of the electrical and mechanical connecting interfaces between

the peripheral equipment and the controller, the controller and the channel, and the channel and the processing unit. These interfaces should be defined and published in detail at the time a new product is announced.

Q. - What degree of importance do you attach to those proposals?

A. - Without an environment where free, healthy competition exists, the end user will suffer greatly along with the peripheral manufacturers. We truly feel that the CPMA proposal is in the best interest of the national economy and the computer user as well as the peripheral community.

We plan to focus our energy to establish the ground rules where our nation's system of free enterprise can apply to the computer industry as it does in other industries today.

Q. - Do you consider IBM your chief adversary?

A. - Who can deny the dominant role IBM plays in the computer industry or the increasing dependency American business has on computers. Because of IBM's dominant position, any steps it takes greatly affects the entire American business: community, computer manufacturers and users alike.

The computer industry is rapidly becoming one of the largest industries in the world and because of its huge size its effect is being felt on nearly every national economy in the free world.

For this reason, CPMA feels that it is vitally important to seek a workable means for encouraging competition in the peripherals business by enacting guidelines that will give everyone the opportunity to compete on a more equal footing.

Q. - How do IBM's recent announcements deviate from your proposal?

A. - Let me give you just one example. When IBM announced its 370/145, in September 1970, it also announced the 2319 disk storage drive. This 2319 drive is functionally identical to the 2314 facility that has been in the field for several years.

The only change is that the controller is built into the 370/145 processor and the three spindle configuration is minimum - priced at \$1,550/mo. This is about one half of the price of the 2314 with three spindles which comes to \$2,935/mo. I cannot see where IBM has changed anything but the name and the price to achieve the 2319.

In order for the user to build up to a full 2314 type facility of eight drives, he must install five additional IBM 2314 spindles at the regular cost. This situation makes it very hard for IBM to sell the 2319 against competition and as the user application grows to require more spindles, IBM then provides the regular 2314 spindles at the higher regular cost.

This price leader technique together with the bundling of the controller within the processor locks in the customer at the initial sale and inhibits healthy competition based on price/performance.

Q. - Do you care to cite any other examples?

A. - CPMA has already declared its position with regard to the bundling of peripherals with controllers. The 2314 and the recently announced 3330 are good examples of this. Both of the cases I have cited indicate a trend toward hardware bundling which could eventually force all companies desiring to build a computer hardware to be able to build a complete system or not compete at all in the industry.

Q. - What are the future plans of CPMA?

A. - We will work for the development of laws, programs and activities that will serve the interests of the end-user community and in the maintenance and expansion of the markets for the products and services offered by the computer peripheral industry.

We will also continue to call attention to those areas where the computer user and the industry are being threatened by the actions of groups or individuals working in their own self-interests.

Not-so-Simple Fly

PASADENA, Calif. - In order to match in complexity the nervous system of a common housefly it would take the services of a \$500,000 computer, according to Dr. Gilbert McCann, director of Booth Computing Center at Cal Tech.

McCann is involved in a research project to learn more about nervous and brain functions of house flies and honey bees, among other creatures. They can observe ultraviolet and polarized light and can see sunlight as a compass.

to elaborate:

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AS YESTERDAY'S NEWS

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YOUR INDUSTRY

- ☐ Manufacturing (computer or data system)
☐ Information services
☐ Software development
☐ Hardware production
☐ Computer services
☐ Other (specify)

Orders and Installations

Computing and Software, Inc. has installed an IBM 360/40 at its Commercial Business Service Division, Long Beach, Calif., to expand its machine capability.

Perry, Dean and Stewart of Boston has installed a Digital Equipment Corp. PDP-15 computer system. The architectural firm specializes in the design of large institutional structures.

Shawmut Transportation, Braintree, Mass., has installed an IBM System/3 for revenue accounting, sales analysis, accounts payable, general ledger and payroll.

Meredith Corp. of Des Moines, Iowa, has ordered an IBM PDP-155 to expand its computerized subscription operations.

Ampex Corp. has begun delivery of Model ECM-65 extended core memory systems to Cornell University's Office of Computer Services, Langmuir Laboratory, Ithaca, N.Y., under a lease contract exceeding \$280,000. The memories will be used in on-line, plug-to-plug operation with the center's IBM 360/65.

Computer Management Group, Ltd. of Scotland has ordered a Burroughs B3500 at a cost of \$1.2 million. The computer, scheduled for installation in Glasgow, will serve Scotland as the heart of one of the first commercial on-line computer systems in the northern U.K.

Security National Bank of Long Island, N.Y., has installed a Potter instrument disk storage system in its data center operation in Melville, N.Y.

The Federal National Mortgage Assoc., Washington, D.C., has installed a CMC KeyProcessing system to expedite data entry for its mortgage contract bidding, loan purchasing and service remittance systems.

Bailey Meter Co., Wickliffe, Ohio, has announced that a second 833 computer system has been sold to Louisiana Power & Light Co. for application to its Nixen Point Steam-Electric Station, Unit 5.

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Applied Magnetics M-200D Disk Memory Features 8.7 msec Average Access Time

GOLETA, Calif. — Applied Magnetics Corp.'s M-200D disk memory system features a head-per-track configuration to provide an access time of 8.7 msec average.

The M-200D provides storage capacities from 265,000 to 6,400,000 bits on from 16 to 128 tracks on a single 12-in. diameter nickel cobalt disk.

A power supply with automatic sequencing, and the complete electronics for expansion to full capacity are housed in a unit using only 8-3/4 vertical in. of standard Rextma rack space.

All rotating components are designed for a 10-year life, and all critical head-to-disk interface relationships have been designed using a mathematical model and a proprietary computer program said to assure consistency of flying characteristics of all heads within the memory.

The M-200D features an "O" ring-sealed, closed loop filtration and cooling system. The system provides a perpetual cleaning action within the disk assembly and, in addition, acts as a heat sink.

The new M-200D Disk Memory System is available for immediate delivery.

Applied Magnetics is at 75 Robin Hill Road.

Panasonic Develops CoS Sensor Lamp Unit

NEW YORK — Panasonic has developed a compact CoS Sensor Lamp Unit.

The unit, Model CU-100, consists of a sensor matrix, Model CR-100S, light

2,048-bit ROMs Have

Customized Chip Select Lines

MOUNTAIN VIEW, Calif. — Fairchild Semiconductor has introduced two static read-only memories, each with a storage capability of 2,048 bits and a design that allows the cascading of eight devices to form an expanded memory without adding external logic components.

Designated the 3507 and 3580, these new MOS integrated circuits come in 24-lead dual-in-line packages and are identical except for their format. The 3507 is organized as 256 words by eight bits, while the 3580 is organized as 512 words by four bits.

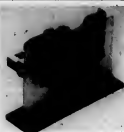
Access time for these read-only memories is very fast, typically less than 1.3 μ sec over a temperature range between 0°C to +70°C.

Both new products are priced at \$30 in 1-24 quantities, \$24 in 25-99 quantities and \$20 in 100-999 lots.

Fairchild is at 313 Fairchild Drive.



Applied Magnetics M-200D Disk



Panasonic's Sensor Lamp



InterSwitch Paper Tape Reader



ICC's ComRac 1010 Memory

New OEM Products

source and card insertion slot for reading the punched holes of a card. It may be installed in any static card reader, the firm said.

The sensor is activated by a fluorescent lamp (4 W, ac 115V). The output is large enough to drive the DTL without any amplification. The problem of heat also is minimized by the low wattage lamp.

The sensors of the CU-100 are arranged in a 10-row and 10-column matrix on a standard Hollerith card format and read 10 punched positions in each of the 10 columns by scanning column by column or row and column simultaneously.

InterSwitch Introduces Punched-Tape Readers

BURLINGAME, Calif. — InterSwitch, a division of the William J. Purdy Co., has announced a new Series DTR Data Tape Readers designed for desktop mounting and reading of any standard punched tape at speeds up to 70 char/sec.

In these unidirectional asynchronous units, tape holes are sensed by means of individually rotating star wheels and adjustable, damped, gold-plated contacts. Noise due to bounce on contact lasts less than 1 msec.

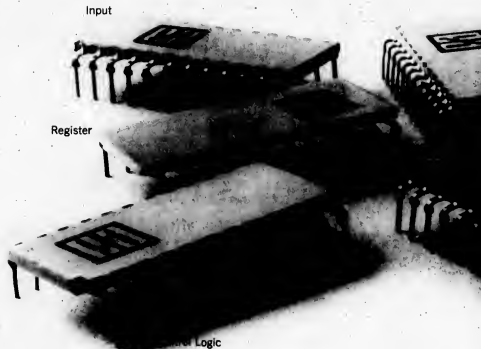
The drive unit is a "drive on release" stepping electromagnet with forward and reverse detenting. The drive coil is suppressed by a zener controlled circuit, limiting back voltage to 18V maximum. Standard coil voltage is 24Vdc, and 12V or 48V operation can be supplied.

Mainframe Core Memory Offers Expandability at Low Cost

EL SEGUNDO, Calif. — Nine hundred msec full cycle time, 350 msec access time and field expandability from 8K to 36 to 32K by 36 are features of a new random access computer mainframe memory system, the Comrac 1010, from Information Control Corp. The memory system uses 3D selection and 22 mil cores.

Price for a 32K by 36 system complete with power supply to power a full 32K by 36 system is less than 4 cents per bit in small quantities.

ICC is at 9610 Bellanca Ave.





CAI Memories



MB's New Synthesizer



LP 200 Light Pen



DID's Card Unit

3M Tape Transport for Cassette Devices Features Single Motor Design, Sensors

CAMARILLO, Calif. — A drive system for high-grade standard magnetic tape cassettes (4 in. by 2-1/2 in. by 3/8 in.) that is said to be easily interfaced has been developed by 3M Co.

The DPC-202 drive is suitable for use in key-to-tape units, data poolers, as computer I/O devices and as mass memory units for systems, data terminals and computers, the company said.

The drive, which was developed for the OEM market, consists of a top plate with cassette loading and positioning mechanisms, a 2-mil read/write head, a capstan and reel drive motor, a drive puck solenoid, an end-of-tape (EOT)/beginning-of-tape (BOT) sensor, and a cassette-in-place sensor. Transport control electronics, normally supplied by the user, are available as an option. The standard unit is a 2-track read/write transport which can operate at speeds of 4, 6, 8 or 12 in/sec.

An important feature of the DPC-202 is its single motor design, the company claimed. This design

employs a patented direction sensing clutch, which permits one dc motor to provide both run and fast rewind motions. This results in a smaller size, lighter weight unit.

It is priced at under \$100 each in quantity.

3M Co., Mincom Division, is at 300 South Lewis Road.

Computer Automation Adds Mainframe Memory Options

NEWPORT BEACH, Calif. — A line of mainframe memories is available with the Computer Automation, Inc. line of OEM computers.

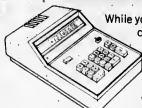
The line features read-only memories, scratch pads, and both large and small core read/write memories.

Options being offered include 1K, 2K and 4K core memories with a 1.5 μ sec cycle time, and a series of 400 nsec read-only memories that can be mixed with 128 and 256 word scratch pad memories.

The company stated that with the low prices of ROM and core memories, the price of the 216 computer with a 1K word memory in OEM quantities of 25 per year was \$4,340.

All memory options plug into standard prewired memory slots in the computer, and can be installed in the field, with no

\$119.04* buys you a quarter of a million dollars in calculator circuit development.



While you're trying to one-up the competition on the drawing board or in the lab, he may already be on the market establishing a position with a low cost, available calculator. Electronic

Arrays can save you a bucket of money, one year in development time, and put you ahead in the calculator ballgame with an MOS/LSI calculator circuit set.

The set consists of six MOS/LSI circuits in 24 pin dual-in-line hermetic packages providing the functions to add, subtract, multiply and divide.

The circuits are in volume production, yet offer the user flexibility in design.

Your proprietary advantages can be maintained through selection of the display system, case design and unique microprogramming to implement additional functions such as square, square root, trigonometric functions and additional memory. Constant generators are also available in ROM for analog displays. And this is just beginning, many other features are possible.

The circuits are not limited to calculator application—they can be utilized in many digital systems requiring real-time data reduction.

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*100 set price



New OEM Products

wiring changes to existing ground planes necessary.

Function Synthesizer Shown By MB Electronics

NEW HAVEN, Conn. — A new function synthesizer for real-time control of periodic functions with virtually any 12-bit or larger digital computer is being offered by MB Electronics, a Tectron company.

Designated the Model D800, the instrument utilizes digital synthesis techniques to generate a variety of analog waveforms over a frequency range with low harmonic distortion. The unit provides frequency control of 0.1% at any point in the frequency range of 0.0002Hz to 16.3KHz.

Sine and cosine outputs are standard. However, square, triangular and special periodic functions are available with the addition of appropriate matrix cards.

It is priced at \$3,450 with OEM quantity discounts available.

Information Control Light Pen Has 2 ft. Lambert Sensitivity

LOS ANGELES — The LP 200 from Information Control Corp. features 3 μ sec response time, less than 2 ft. Lambert sensitivity, interchangeable optics and a touch actuated switch.

The optical receiver portion of the LP 200 detects light changes within the acceptance area by a high-speed photo-sensitive element in the pen.

The processing electronics portion is contained on a separate PC board which is usually mounted in the CRT chassis. It amplifies the light pulses received from the pen, thresholds it to remove the noise, and outputs a 10 μ sec positive going pulse.

DID Shows Magnetic Card Unit As Manual I/O Device

LIONVILLE, Pa. — A magnetic card unit produced by Digital Information Devices, Inc. (DID) is designed for use as a manual I/O device.

The unit uses credit card size magnetically coated cards with a capacity of over 400 bytes of information. A file protect feature prevents accidental erasure of data on the magnetic cards.

It is available as an option to DID's Data Transcriber sold to users by MAI. The unit is also sold with appropriate interface on an OEM basis.

The firm is at 210 Welsh Pool Road.

Memory

Output

Arithmetic

Amplifier Response Time 25 nsec

MOUNTAIN VIEW, Calif. — A two-channel core memory sense amplifier, which provides a 25 nsec response time and a typical

threshold accuracy of 22 mV is now available from Fairchild Semiconductor.

The $\mu A761$ is designed as a

low-cost, pin-for-pin replacement for 7524 and 7525 devices.

It is available in a hermetically sealed ceramic 16-lead, dual-in-line package.

The design features two independent channels, each of which can sense up to 4,000 bits of information. These channels share common reference and supply voltages.

Independent strobe inputs are provided on each channel to enable the amplifier during core peaking times. Unwanted signals are thus rejected. The $\mu A761$ specifications guarantee actual in-system AC operating requirements for minimum "1" and maximum "0" signal conditions.

All logic inputs and outputs are fully compatible with TTL logic. The device can be combined with Fairchild's MSI 9314 quad latch to provide the function of a complete memory data register.

Fairchild is currently offering its new circuit in two grades: the $\mu A761C$, with a 24 mV threshold accuracy, and the $\mu A761D$, with a 27 mV threshold accuracy. Prices are \$7.13 for the $\mu A761C$ and \$3.75 for the $\mu A761D$ in 1-24 quantities.

Fairchild Semiconductor is at 464 Ellis St.

Bryant Expands CLC-1 Drum Capacity

WALLED LAKE, Mich. — Bryant Computer Products is offering OEM users a version of its CLC-1 drum memory with 33% greater capacity at a 10% increase in price.

The addition of 16 data tracks to the drum increased the storage to a total of 64 tracks.

Designed to fit a 19 in. rack,

the drum uses a head-per-track design that results in an average access time of 8.4 msec. Data is transferred at a rate of 2.2 Mbit/sec.

The price of the enhanced model is \$5,000 in lots of 10.

Bryant Computer Products is at 850 Ladd Road.

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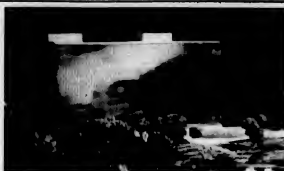
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CAMBRIDGE COMPUTER ASSOCIATES, INC.



Artist's Concept of New Headquarters for RCA's Computer Operations

RCA's DP Headquarters To Move to Massachusetts

MARLBORO, Mass. — RCA

plans to construct a \$16 million office building here as the future headquarters of the company's information systems group and its Computer Systems Division.

Both information systems and computer systems are presently headquartered in Cherry Hill, N.J. The proposed building eventually will house the management, administrative, marketing and financial functions of both the group and the division. It will be built adjacent to RCA's recently constructed \$22 million peripheral production and eng-

neering and design facility in Marlboro.

RCA presently employs approximately 1,250 persons in Marlboro. With the movement of both the information system and computer systems headquarters, this number is expected to climb to more than 4,300 by the end of 1973.

According to RCA, the shift from Cherry Hill to Marlboro will be carried out over a period of a little more than two years. Present plans call for top management to move to the new location by mid-1971.

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Executive Corner

NCR Expands Functions of 2 VPs

DAYTON, Ohio—Two vice-presidents of the National Cash Register Co. have been assigned broader management responsibilities.

Donald E. Eckdahl, vice-president and general manager of the company's Data Processing Division, has been named vice-president, manufacturing operations.

In his new position Eckdahl will supervise NCR's Data Processing Division, the Data Terminals Division and the International Manufacturing Division. Each of these divisions includes a number of plants involved in production, engineering, quality control and distribution functions.

Also reporting to Eckdahl will be NCR's subsidiary, Electronic Communications, Inc., and the NCR Military Division.

Curt F. Rench, vice-president of corporate product development, becomes vice-president, research and development, under the new alignment. He will be responsible for NCR's worldwide new product development activities, for central research operations and for advanced development.

Other Moves

Microfilm Data Systems, Inc., Menlo Park, Calif., has named Dean T. Mack executive vice-president and general manager.

William T. Smith has joined Technical Services Corp. of Philadelphia as vice-president and general manager.

Albert E. Mignone has been appointed vice-president of operations for Photon, Inc., Wilmington, Mass.

Comet, Inc. of St. Paul, Minn., has elected D.J. Heriman, chairman of the company's board of directors, to president and chief executive officer.

Recognition Equipment Inc. of Dallas has announced the following appointments: Is Sheinberg has been elected executive vice-president and chief operating officer; Marie J. Volding has been elected executive vice-president and chief financial officer; Leonard J. Nunley has been named senior vice-president and chief technical officer; and Edgar S. Brower, president of Recognition Terminals Inc., a subsidiary, has also been named vice-president of Recognition Equipment.

James J. Connolly has been elected president of Inter-Computer Electronics, Inc., Lansdale, Pa.

Compute, Inc. of Cambridge, Mass., has named Irving R. Schwartz vice-president, marketing.

Stephen R. Levy has been elected a vice-president of Bolt Beranek and Newman, Inc., Cambridge, Mass.

Tracor Computing Corp., Austin, Texas, has appointed G.S. Moranz vice-president, administrative and fiscal affairs.

Robert C. Olson has been named senior vice-president, operations of Data Processing Financial & General Corp. of Hartford, N.Y.

Statistical Tabulating Corp., Chicago, has appointed John J. Jensen to the position of president of the Computer and Business Systems Institute, the company's educational division.

Michael W. Ricciardelli has been appointed vice-president, marketing, of Computer Task Group, Inc., Buffalo, N.Y.

Computer Assistance, Inc., West Hartford, Conn., has announced the appointment of C.K. Quimby as vice-president and manager in New York City.

Computer Synectics, Inc., Santa Clara, Calif., has announced the following appointments: Philippe Yaconelli has become president; Sol Zaslouf was appointed vice-president, marketing; and William Floyd has become vice-president, finance and administration.

Robert Defelices has been elected vice-president of Graham Magnetics, Inc., Graham, Texas.

I/O Com, Inc., Sunnyvale, Calif., has announced the appointment of F.A. Ryder as its president.

Thomas W. Burgess has been promoted to vice-president of marketing and elected a director of Mini-Com, Inc., Natick, Mass.

IBM Researchers Unveil Device With 'High' Switching Speeds

WASHINGTON, D.C.—An experimental silicon field-effect transistor with a cut-off frequency of 14 GHz was described by an IBM scientist at the IEEE Electron Devices Conference recently. So far, as is known, this is the highest frequency ever reported for a silicon transistor, IBM said.

Device owes its high speed to the use of ion implantation for critical doping steps. As described in a paper by Dr. Frank F. Fang and Dr. Billy L. Crowder of IBM's Research Division, ion implantation permits "self alignment" of the geometry of the source-gate-drain region. This is done by implanting phosphorus ions after the aluminum gate has been formed.

Source, Drain Regions Extended

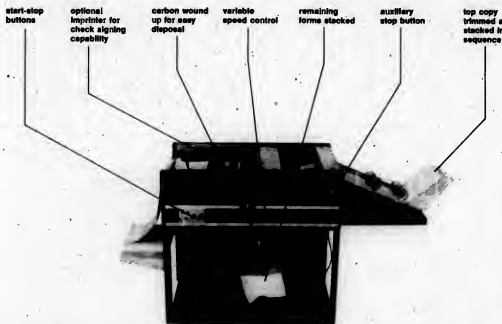
The ion energy is such that the ions

cannot penetrate the aluminum, but dope the semiconductor on both sides of it, thus extending the source and drain regions exactly to the edges of the gate.

The transistors are made starting with high-resistivity p-type silicon to minimize parasitic losses in the substrate. The source and drain regions are diffusion doped n+ with phosphorus. The area between them is then ion implanted with boron to produce a higher conductivity p-type material adjacent to source and drain.

The high cut-off frequencies of the devices and their high gain at frequencies of 5-10 GHz make them attractive for microwave communications and radar applications. Their high oscillation frequency also implies high switching speeds for computer applications.

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THE FLUX RING MEMORY. HERE'S WHAT IT ISN'T.

IT ISN'T SLOW AND BULKY LIKE THE CORE

Remember the vacuum tube? It was the dominant component of all things electronic just a few short years ago.

The core is like the vacuum tube. It has dominated main frame computer memories for the past two decades, because it was the only game in town.

Until now. The Signal Galaxies Flux Ring magnetic memory runs rings around the core in every way.

Flux Ring memories have an initial access time of 40 nanoseconds compared to 200 for cores. Flux Ring memories have a cycle time of 100 nanoseconds compared to 600 for cores.

Flux Ring memories have a complementary bit structure which cancels common mode noise.

Flux Ring memories have a Mean Time Between Failure several times better than the best core memory you can buy.

You can buy an 8,192 bit Flux Ring array for less than a penny a bit. Or a 65,536 bit Flux Ring stack for under 0.8¢ a bit.

Can you think of any reason for specifying a core memory rather than a Flux Ring memory?

IT ISN'T EXPENSIVELY COMPLEX LIKE PLATED WIRE.

Plated wire memories came along during the mid-'60s because cores just couldn't hack the tough environmental specs asked for on some military and space programs.

Plated wire has been coming—and coming—and coming—ever since. Like the old political challenger who was never quite elected. Or the ball team that always finished second.

And with Flux Ring now on the scene the road will be even tougher.

Here's why.

Flux Ring is equal or superior to Plated Wire in every important specification.

Yet Flux Ring memories cost less than half as much on a bit for bit basis.

Check the Flux Ring specs we covered in column one. Compare them to the best Plated Wire specs available anywhere.

You'll find the Flux Ring memory is about twice as fast. It requires less complex electronics. Operates on about one-half the drive current. Has a much better Mean Time Between Failures. And, being batch processed, costs a lot less.

Can you think of any reason for specifying Plated Wire instead of Flux Ring?

IT ISN'T VOLATILE LIKE A SEMI

Non-volatility is very important in military, and many commercial applications where loss of power could cause critical problems due to data loss in the memory.

The Flux Ring memory is not volatile.

But that's not the only advantage of the Flux Ring over the various kinds of semi-conductor memories.

Particularly if your requirements exist today!

Have you noticed how the semi-conductor people speak of the dramatic breakthroughs in price and performance which will take place in 1973—or 1975.

On the other hand, Flux Ring memories are here now. The yields are high.

When you look at the fine print you'll find Flux Ring memories are faster than ICs. And when all of the costs are added up you'll find them to be less expensive too.

Should you specify a semi-conductor memory without at least looking at an equivalent Flux Ring?

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What is a Flux Ring?

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Advertisement for Book

Special program will be prepared by the State Central Data Processing Authority, 508 Robert E. Lee Building, Jackson, Mississippi, 39202, on until 2:00 p.m., Monday, December 14, 1970, for the following data processing service:

Request for Proposal No. 14 General System Design and Implementation Plan for a Law Enforcement and Criminal Justice System for the State of Mississippi. Request for Proposal specifications may be obtained from the office of the State Central Data Processing Authority by sending a check or money order payable to "State Central Data Processing Authority," for ninety-five dollars (\$95.00). This charge is made for the purpose of offsetting advertising, reproduction, and distribution costs of the RFP specification.

Specifications may be reviewed at no charge in the office of the State Central Data Processing Authority between the hours of 10:00 a.m. and 3:00 p.m., Monday through Friday.

A bidder conference will be held at 9:00 a.m., Monday, November 30, 1970. Prospective bidders not attending conference will be disadvantaged.

The State Central Data Processing Authority reserves the right to reject any and all proposals and to award informally.

STATE CENTRAL DATA PROCESSING AUTHORITY
Charles L. Guest, Executive Director

OPEN LETTER TO ORGANIZATIONS INVOLVED IN EDP TRAINING

Under contract to the Forrest Service, U.S. Department of Agriculture, Wiley Systems, Inc. is required to compile a catalog of self-teaching data processing courses currently available in the area of:

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- EDP Management Training

Your prompt response will assure your inclusion in the catalog which will be used by the Forrest Service as a source of EDP training for its EDP Career Development program.

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Mr. Richard Nemerson
Forrest Service Project Manager

wiley
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Metascience to Market 'First' Analysis Program

FORT WASHINGTON, Pa.

Metallogists and other technicians interested in spectrographic analysis of materials can now use Fax Infrared Search Technique-1 (First-I) to search infrared data files.

First-I is available as a package from Metascience Inc. for in-house use or as a service for the more casual user. It was developed by DNA Systems of Flint, Mich.

Written in Fortran, First-I functions on IBM's 1130 or 1800 central processors and does not involve a direct link between spectrograph and computer. Instead, digitized codes of 92,000 compounds, based on standards of the American Society of Testing and Materials, are stored on disk.

A description of the unknown compound's spectrum is passed against the disk file, at speeds up to 1,000 compounds/sec, and in a single pass First-I finds and scores the best 20 matches.

Data entry can be made through punched cards or console keyboard, Metascience said, and the codes are easy to learn, using only conventional spectroscopic units. A line-scanning technique within the program automatically corrects most input errors, a spokesman noted.

An optional feature allows the user to add his own data to the standard file to allow for searches beyond the ASTM "catalog."

The package, now in the process of being extended and updated, is priced at \$900 for the 1130 version, and from \$1,500 for the 1800.

Metascience Inc. is at 515 Summit Ave.

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Nickels and Dimes

Despite a healthy rise in sales from \$4.1 million for fiscal 1969 to \$7.4 million for 1970, Vermont Research Corp., makers of rotating memories, had a fairly even profit level, earning \$245,451 in 1970, as opposed to \$221,650 in 1969. In addition, there was a \$39,000 extraordinary charge for a cancelled stock offering which brought per share earnings down to 29 cents, compared to 34 cents in 1969.

SSS

Tarm-mite growers Digital Information Devices are chewing away at the per share losses of a new company, reducing the loss to 10 cents for this year's first quarter from 16 cents last year. Sales for the quarter were \$4,000, as opposed to \$16,000 for the first quarter of last year and \$319,000 for all of fiscal 1970. Net loss for the quarter dropped to \$232,000 from \$373,000.

SSS

Recognition Equipment has sold its Doucet subsidiary to Information Processing Corp. for an undisclosed price. REI keeps about 5% of the outstanding shares, while IPC has 53.8%. Doucet is just finishing up the sale of \$1 million worth of convertible debentures to finance the automated baggage handling system, it has under development. REI will service the Doucet financial equipment for one year, but Doucet will take over the manufacture of the financial systems immediately.

SSS

Once more with feeling: slightly higher sales coupled with lower earnings, this time for Applied Data Research. For the quarter ended Sept. 30, the Princeton software house had operating revenues of \$1.9 million, up from \$1.6 million a year earlier, but operating income nosedived to \$46,524 from \$76,366, including a special credit of \$77,000 from the conversion of debentures, per share earnings for the quarter came to 12 cents compared to eight cents in 1969.

SSS

The news isn't so good at Electronic Magnetic and Magnetics, either. Company reported a third quarter operating loss, after taxes and preferred dividends, of slightly more than \$1 million, compared to a profit of slightly more than \$1 million in 1969. Sales remained flat. For the nine months, sales have crept up from \$67.4 million to \$71.4 million, but a \$3.3 million profit has turned to an \$18,000 loss.

SSS

While in Newport Beach, Calif., Computer Reporting Systems, a computerized credit reporting company, has had its equipment repossessed by IBM, CDC, and Stromberg Carlson. Its phone service has been cut off, and it has terminated the lease on its office.

Seems it ran out of credit.

CalComp Levels Charges in Memorex Suit

ANAHEIM, Calif. — In round two of the disk drive patent battle between California Computer Products and Memorex Corp., CalComp has charged Memorex with unfair competition, misleading patents, and a conspiracy to monopolize the market for IBM compatible disk drive systems.

CalComp's allegations were lodged in a reply and counter-

claim to a Memorex suit filed in a federal court in Los Angeles last month.

Memorex's original suit complains that CalComp infringed its patents on the models 630 and 660 disk drives. Memorex said that CalComp's Century Data Systems subsidiary was marketing a disk drive that was a "copy" of the Memorex unit.

The tale of corporate intrigue

told by the Memorex suit centers on two current officers of Century who became "privy to proprietary information" when they were employees of Scientific Data Systems, which was engaged in negotiations with a Memorex subsidiary at the time.

According to Memorex, the two used information secured during these talks to make Century's current disk drive.

Century thus "was able to produce a disk drive substantially sooner than it otherwise would have been able to and to produce a disk drive of substantially higher quality than it otherwise would have been capable of."

Memorex is seeking an injunction against CalComp and Century, triple damages, recovery of profits lost as a result of the alleged infringement, and destruction of stocks of equipment based on the infringement.

In its reply and counterclaim, CalComp also asserted that Model III disk drive is of very high quality "but denied" that this high quality was a consequence of any unlawful acts. CalComp also asserted that Memorex's patent on a transducer is "indefinite, ambiguous, uncertain, and incomprehensible."

General Automation, Data General Sales Increase, But GA Doubles Its Losses

Sometimes companies win, sometimes companies lose, and sometimes they're just ruined out — even in the minicomputer business.

Close on the heels of DEC's report of a less than sparkling quarter [CW, Nov. 4], Nova-making Data General Corp. has reported record sales and earnings, while General Automation reported a 270% rise in sales coupled with only doubled losses.

Data General's sales for the fiscal year were \$7.04 million, compared with \$1.03 million reported for fiscal 1969.

Earnings for the recent fiscal year were \$336,000 or 28 cents per share, assuming full taxes had been payable, contrasted with the loss of \$268,000, or a loss of 17 cents per share, reported for the comparable period last year.

General Automation's sales for the fiscal year were \$7.04 million, compared with \$1.03 million reported for fiscal 1969.

Earnings for the recent fiscal year were \$336,000 or 28 cents per share, assuming full taxes had been payable, contrasted with the loss of \$268,000, or a loss of 17 cents per share, reported for the comparable period last year.

Using past accounting methods and excluding some special charges, REI and its OCR subsidiaries would have reported net income for the year ended Oct. 31, 1970, substantially less than the \$3.7 million earned for the comparable period last year.

The company said it plans to expense approximately \$9 million of formerly deferred research and development costs effective with the 1970 fiscal year.

Under the new accounting method fiscal 1969, which was Recognition Equipment's first profitable year, would still have reflected a net profit of approximately \$1.5 million, President Herman L. Philipson said.

Other special items that will affect the company's 1970 results include a gain on the recent sale of a majority interest in Doucet Corp. and establishment of reserves for possible losses on investments in affiliates and inventory obsolescence.

Including an extraordinary credit this year of \$200,000 or 10 cents per share in the form of a tax loss carried forward, actual earnings for the 1970 fiscal year amounted to \$736,000 or 38 cents per share. DEC's tax loss carried forward has now been fully utilized, the company said.

Sales up, Earnings Down

Meanwhile, results for 1970 show General Automation fiscal year sales jumped to \$7.5 million, compared to \$2 million for a like period last year. The year's operations resulted in losses of \$1.7 million compared with \$799,000 the previous year.

Fourth quarter sales were \$2.9 million with a near breakeven loss of \$32,000 or 1% of sales. In 1969 the fourth quarter produced sales of \$919,000 and a loss of \$244,000.

In October, General Automa-

tion completed a public issue of 300,000 shares of stock which netted \$3.8 million. During the first half of the year, the company obtained a \$5.3 million line of credit.



COMPUTERWORLD

financial

Boothe Acquires GAC Unit

SAN FRANCISCO — Boothe Computer Corp. (BCC) has purchased all of the stock of GAC Computer Leasing Corp., a subsidiary of GAC Corp.

The transaction was for a total of \$5.3 million. BCC will also assume approximately \$38 million of senior debt from GAC.

In a separate but related transaction, GAC agreed to sell Boothe Computer \$5 million for eight years. The proceeds of this loan will be used for general corporate purposes.

BCC Chairman D.P. Boothe

said: "This acquisition will add \$50 million of computers to our portfolio and will make Boothe Computer the largest leaser, other than IBM, of IBM System 360 computers in the world. This portfolio will be incorporated into existing BCC marketing operations."

"We anticipate substantial gains in both operational efficiency and profitability with this addition," he concluded.

BCC has approximately \$180 million of computers on lease with annual rentals in excess of \$44 million.

Ennis Brandon Computer Services Shows Loss for Six Month Period

DALLAS — Ennis Brandon Computer Services, Inc. has reported gross revenues of \$116,154, of which \$96,125 was offset against unrecovered development costs for the six months ended Aug. 31.

Remaining net revenues of \$19,229 less operating expenses of \$26,394 resulted in a loss of \$27,165 or 89 cents per share. President Arnold D. Palley said that, as a new company, Ennis Brandon has had difficulty in overcoming the buyer resistance bred by the general economic

decline. The firm has reset its target date for achievement of profitability and is now anticipating attainment of that goal at a point late in the next fiscal year.

He said the company has taken a number of steps designed to improve revenues and reduce operating costs, and with continued recovery in the economy, he expects improvement during the second half of the year.

Majl Revenues Climb

WHITE PLAINS, N.Y. — Mathematical Application Group, Inc. has reported that for the six-month period ended Sept. 30 revenues were \$735,202 compared with \$591,360 for the same period a year earlier. Net income was \$10,156 or one cent per share, compared with \$41,961, or six cents per share a year earlier, when a smaller number of shares were outstanding. The company attributed the earnings decline to operations of The Recording, Inc., a subsidiary which has been dissolved.

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BTSI Designed to Automate Brokerage Procedures

NEW YORK — GT&E Information Systems Inc. and Control Data Corp. have formed a company to provide computer and data transmission services to

automate brokerage house procedures.

The new company, Brokerage Transaction Services Inc. (BTSI), will combine the sales organiza-

tion of Ultronic Systems Corp., a GT&E Information Systems company, with Control Data's DP experience to provide the brokerage community with an automated front and back-office, multiple-user service from a single source.

Ultronic operates a 100,000-mile international stock and commodity quotation network with more than 18,000 computer video terminals currently in use in brokerage houses.

The company will also provide service to BTSI customers through 56 Ultronic service centers located throughout the country.

BTSI will use an enhanced version of the CDC 3300 which was developed to meet the needs of the brokerage houses.

The BTSI service will automatically accept orders from brokerage branch offices, deliver them to the floor of the appropriate exchange, and return the execution report to the originating office, while simultaneously effecting an automated order match.

In complex back office applica-

tions, BTSI will automate various functions, thereby minimizing most of the maze of paperwork that has plagued brokerage houses in recent years.

The new service also will permit the instant retrieval of brokerage information, such as purchase and sales data, management reports, commission or trading analysis, and dividend and payment reports, BTSI said.

The service will be implemented by establishing special computer centers throughout the U.S. with duplex Control Data computers serving as the heart of each center. The initial center is in New York City. Future plans call for the establishment of four additional computer centers in New York, Chicago, San Francisco, and Dallas.

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10% Annual Growth Rate Predicted For Business Forms Used With OCR

PALM SPRINGS, Calif. — Annual sales of business forms used with optical character recognition (OCR) equipment in data processing will grow from its present \$25 million level to approximately \$250 million by 1975, an increase of from 2% to nearly 10% of annual sales for the overall business forms industry.

Robert I. Verb, director of graphic services for Management Concepts, Inc., made this prediction at the annual meeting of the National Business Forms Association here.

Annual sales of the total business forms industry are presently estimated at \$1.2 billion and are expected to grow to \$2 billion during the same period, Verb said.

"There is substantial evidence to indicate that the use of OCR will expand in virtually all industries over the next few years," he continued.

"While the costs of computing are gradually being reduced today, the costs of data input are increasing," Verb noted. "As a result, more and more firms are looking into OCR benefits."

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LOGICON'S OTHER OFFICES ARE LOCATED IN SAN DIEGO AND WASHINGTON, D.C.

New Registrations

COMPUTER AND APPLIED SCIENCES, INC., 1401 DEKARD ST., Newtown, Pa., a company engaged in theoretical research programs for government agencies and industry, filed to register 200,000 shares of common stock. Of the proceeds, at \$10 per share maximum, \$200,000 is intended for the development of a personnel management information system for hospitals and \$1.2 million is to be used by its subsidiary, Medical Diagnostic Centers, Inc., for establishment of satellite centers and for related activities; the balance will be added to the company's working capital and used for general corporate purposes. No underwriter is involved.

DECISION DATA, 300 Jacksonville Road, Warrminster, Pa., a company engaged in the development, manufacture and marketing of computer auxiliary equipment to prepare and process the 86-column punch card, has filed to register 100,000 shares of common stock. The proceeds, at \$15 per share maximum, intended for new product development, expansion of production equipment and facilities and the production of inventory, expansion of marketing activities and for general corporate purposes. No underwriter is involved.

ALLSTATS-PROGRAMMING AND SYSTEMS, INC., 151 W. 51st St., New York, a company engaged in the operation of a CP service bureau in a broad range of commercial applications, filed to register 162,106 shares of common stock for subscription by common stockholders of Programming and Systems, Inc. (\$50), at the rate of one share for each 20 PSI shares held. Proceeds, at \$2 per share maximum, intended for the payment of notes held by PSI and other representing advances for the payment of taxes, the development of a marketing program, and other purposes.

ELECTRONIC DATA SYSTEMS (EDS), 1300 E.O.S. Center, Exchange Park, Dallas, a company engaged in **Informatics Shows Profit For Six-Month Period**.

CANDGA PARK, Calif.—Informatics Inc. has reported net income of \$120,000 on revenues of \$9.4 million for the first six months of fiscal 1971, compared with a net loss of \$170,000 on revenues of \$9 million for the like period last year.

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developing business information systems for corporate customers and then installing and operating such systems, utilizing computers generally owned or leased and always operated by the company, has filed to register 300,000 outstanding shares of common stock. The offering price is \$58.75 per share maximum. The underwriter is R.W. Preston & Co., Inc., 60 Pine St., New York 10005.

BURROUGHS CORP., 6071 Second Ave., Detroit, Mich., a company engaged in designing, developing, manufacturing, distributing and servicing a broad line of business equipment, filed to register one million shares of common stock. Proceeds, at \$118.75 per share maximum, intended for the reduction of short-term debt. The underwriter is Kieker, Readdy & Co., Inc., 20 Exchange Place, and Latham Brothers, One William St., both of New York.

JAMES TALCOTT, INC., 1290 Avenue of the Americas, New York, a company engaged principally in business financing, factoring, consumer financing and computer leasing, filed to register \$25 million of

senior notes, due 1976. Proceeds will be added to general funds and used initially to reduce short-term indebtedness. The underwriters are White, Weld & Co., 20 Broad St., and Goldman, Sachs & Co., 55 Broad St., both of New York.

BANK COMPUTER NETWORK CORP., 323 N. Michigan Ave., Chicago, Ill., a company proposing to develop a national centralized data system with nearly instantaneous retrieval capabilities, consisting of an interrelated group of computer programs and documentation intended to meet certain of the electronic data needs of the commercial banking industry, filed to register 200,000 shares of common stock. Of the proceeds, at \$20 per share, \$500,000 intended for use in marketing, promotion, and related activities, \$800,000 for purchase of electronic terminal for lease to subscribers, and \$700,000 for software and data base research, development, updating, and other documentation; the balance will be added to the company's working capital. No underwriter is involved.

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Request for Proposal No. 16—Lease or purchase of a small computer system with the necessary control logic for laboratory instrumentation.

Detailed proposal specification may be obtained from the office of the State Central Data Processing Authority. The State Central Data Processing Authority reserves the right to reject any and all bids and proposals and to waive informalities.

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Charles E. Guest
Executive Director

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES THURSDAY, NOVEMBER 12, 1970

E X C		PRICE					E X C		PRICE				
		1970 RANGE	NOV 11 1970	WEEK HIGH	WEEK LOW	NET CHG			1970 RANGE	NOV 11 1970	WEEK HIGH	WEEK LOW	NET CHG
SOFTWARE & EDP SERVICES													
O	ADVANCED COMP TECH.	1-8	2 1/8	+ 3/4	+13.3		O	STANDARD REGISTER	17-30	10 1/8	+2	+11.5	
A	APPLIED DATA RES.	4-24	8 1/8	+1/8	-2.0		N	JARCO	22-39	22 3/4	+ 1/4	+1.1	
O	APPLIED LOGIC	1-10	1 3/8	+1/8	+10.0		A	WAKASH MAGNETICS	7-30	7 3/4	-2	-76.5	
O	ARTIS	1-8	2 3/8	+ 3/8	+5.5		O	WALLACE BUS FORMS	18-33	5 1/8	+ 1/8	+0.7	
A	AUTOMATIC DATA PROC	23-47	42 3/8	+ 3/4	+0.5								
O	AUTO SCIENCES	3-14	5 1/8	- 7/8	-15.9		COMPUTER SYSTEMS						
O	BRANDON APPLIED SYS	1-8	1 1/8	- 1/8	-1.1		N	BURROUGHS CORP	78-175	105 3/4	+ 1/2	-7.4	
O	COMPUTER AGE INDUS.	1-3	1	- 1/4	-0.0		N	COLLINS RADIO	6-37	12 7/8	-1 7/8	-12.7	
O	COMPUTER ENVIRON	3-16	2 1/2	0	-2.0		N	CONTROL DATA CORP	50-122	63 1/2	-1 1/4	-5.7	
O	COMPUTER INQUIRY	2-10	5	0	0.0		N	CATA GENERAL CORP	16-35	26 3/4	- 3/4	-6.9	
O	COMPUTER NETWORK	3-16	3	-1	-25.0		N	DIGITAL EQUIPMENT	50-124	58	- 1/2	-8.6	
O	COMPUTER PROPERTY	5-15	5 1/2	- 1/2	-6.3		N	ELECTRONIC SCIENCE	3-11	4 1/2	- 1/4	-5.2	
N	COMPUTER SCIENCES	8-36	10 1/2	- 3/4	-4.8		A	ELECTRONIC ENGINEER.	18-39	21 3/8	- 3/2	-7.8	
O	COMPUTER USAGE	2-8	4	+ 1/2	+7.8		N	GENERAL AUTOMATION	5-62	12	- 1/2	-0.7	
A	COMPUTING 9 SOFTWARE	15-25	27 3/4	+ 1/8	-3.8		N	GENERAL ELECTRIC	80-88	85 5/8	- 1 1/4	-1.4	
O	COMRESS	2-10	5	0	0.0		N	HEWLETT-PACKARD CO	19-45	25	-2	-3.4	
O	COMSHARE	3-15	3 3/8	+ 1/4	-8.0		N	HONEYWELL INC.	85-152	74	- 1/2	-7.8	
O	CONSOL. ANAL. CENT.	1-3	1 1/4	0	0.0		N	IBM	223-287	267 1/8	+ 1/2	+1.5	
O	DATA AUTOMATION	1-26	1 7/8	+ 3/4	+15.3		N	HCR	30-86	38 1/2	- 1/4	-0.5	
O	DATA PACKAGING	1-8	2 1/8	- 1/8	-5.5		N	RCA	18-34	23 3/8	- 1/4	-1.0	
O	DATAMATION SERVICE	1-8	2 1/8	- 1/8	-5.5		N	BAYTECH CO	16-33	20 1/4	- 1/4	-0.8	
O	DATASYS	4-8	6	+ 1/2	+10.0		O	SCI. CONTROL CORP.	1-8	1 7/8	+ 1/4	+1.7	
O	DIGITEK	1-5	1 1/8	+ 1/8	+10.0		N	SPERRY RAND	16-40	22 1/2	+ 1/4	+1.1	
O	EDP RESOURCES	1-15	6 3/4	+ 3/4	-3.3		A	SYSTEMS ENG. LABS	10-19	15 5/8	- 1 3/4	-7.4	
A	ELECT COM PROD	3-11	4	- 5/8	-13.5		N	TECH	8-26	34 1/2	- 1/2	-1.1	
O	ELECTRONIC DATA SYS.	11-161	60 1/2	- 1/2	-7.8		N	VARIAN ASSOCIATES	18-31	30 1/8	- 3/8	-7.0	
O	INFORMATICS	4-21	6 1/8	- 1/8	-1.0		N	XEROX CORP	88-115	85	- 1/2	-0.5	
O	LEVIN-TOWNSON SERV.	1-13	1 3/4	0	0.0		LEASING COMPANIES						
A	MANAGEMENT DATA	8-25	6 1/8	- 7/8	-8.7		O	BOOTH COMPUTER	8-25	12 5/8	- 1/8	-0.9	
O	NAT COM ANALYSTS	1-8	2 1/4	- 1/8	-5.2		O	BREKHAAM COMP.	3-8	2 5/8	- 1/4	-1.5	
O	NAV. COMP. SERV.	1-13	1 1/4	- 1/8	-1.0		O	COMPUTER EXCHANGE	4-12	7 1/2	- 1/4	-0.7	
N	PLANNING RESEARCH	13-58	17 5/8	+ 1/8	-5.0		A	COMPUTER INVESTS GRP	8-32	11 1/8	- 1/4	-1.7	
O	PROGRAMMING METHODS	8-27	16	+ 3/2	+3.0		O	DATA PROC. F.A.C.	2-8	3	- 1/4	-7.6	
O	PROGRAMMING 8 SYS	2-7	6	- 1/2	-10.0		O	DATA RENTAL	10-26	20 3/4	+ 1/2	+7.4	
L	PROGRAMMING SCIENCES	1-33	1 5/8	+ 3/8	+30.0		O	DIALECTIC CORP. LEAS.	2-8	4 1/4	+ 1/4	+4.4	
N	SCIENTIFIC RESOURCES	2-22	3 3/4	- 3/8	-6.0		A	DPA, INC.	7-22	10 7/8	- 1/8	-1.2	
O	SOFTWARE SVCS	1-13	1 1/4	- 1/8	-1.0		O	GRANITE MGT	1-12	5 1/8	- 1/4	-1.1	
O	TDS COMPUTER CENTERS	4-27	4 1/2	- 1/8	-5.0		O	GREENWOOD GROUP	7-30	10 7/8	- 1/2	-12.1	
O	UNITED DATA CENTERS	2-8	2 1/4	0	0.0		O	LECTRO COM LEAS	2-8	2 5/8	- 1/8	-4.5	
N	UNIVERSITY COMPUTING	14-39	7 1/8	- 7/8	-10.0		O	LEVIN-TOWNSON CHP	1-3	1 1/8	- 1/4	-4.1	
O	US SYSTEMS	5-21	7 1/8	- 7/8	-10.0		O	LINC DATA, INC.	1-3	1 1/8	- 1/4	-4.1	
O	U.S. TIME SHARING	3-14	2 5/4	- 1/8	-4.3		O	NCC INDUSTRIES	3-8	3 3/4	- 1/4	-6.2	
PERIPHERALS & SUBSYSTEMS													
N	ADDRESSOGRAPH-MULTI	21-62	23 5/8	- 1/4	-1.0		O	SYSTEMS CAPITAL	3-10	13	- 7/8	-6.3	
O	ALPHAMEMOR	2-15	3	+ 3/4	+8.0		O	TELETYPE UNIT	2-8	2 5/8	- 1/8	-4.5	
N	AMER. CORP.	13-48	16 1/4	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	ASTRODATA	2-14	2 1/8	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	ATLANTIC TECHNOLOGY	2-14	5 1/2	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	BOLY, GERANKE & NEW	3-11	6 7/8	- 1/8	-1.7		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	BUNKER-RAMO	5-14	8 7/8	+ 3/4	+2.8		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	CALCOMP	11-34	30 1/8	- 3 1/2	-12.1		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	COMINTRONICS	3-13	5 3/4	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	COLORADO INSTRUMENTS	8-13	6	+ 1/2	+8.4		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	COMPUTER COMMUN.	4-12	4	- 1/2	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	COMPUTER EQUIPMENT	4-12	4	- 1/2	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	COMPUTEST	12-28	12	-3	-20.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	DATA PRODUCTS CORP	8-28	6 3/8	- 3/4	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	DATA TECHNOLOGY	4-23	8	- 1/8	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	DIGITRONICS	4-13	4 1/8	- 1/8	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	ELECTRONIC M & M	7-28	12	- 1/8	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	FABRI-TEC	2-8	2 1/4	- 3/8	-16.2		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	FARRINGTON MFO	2-17	2 5/8	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	INFORMATION DISPLAYS	4-20	6 1/2	0	0.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	MANAGEMENT ASSIST	1-13	1 1/4	- 1/8	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	MARSHALL INDUSTRIES	14-67	23 1/8	- 2 3/8	-9.3		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	MILRO ELECTRONICS	15-42	12	- 3/4	-14.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	MONARK DATA SCI.	2-14	5 1/2	- 1/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	OPTICAL SCANNING	11-52	18	+ 1 1/2	+9.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	PHOTON	4-17	6 1/4	+ 3/8	+1.3		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	PHOTO-MAGNETIC SYS.	4-17	6 1/4	+ 3/8	+1.3		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	POTTER INSTRUMENT	15-42	12	- 3/4	-14.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	PRECISION INST.	8-25	25	+ 3/4	+8.4		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	RECONSTRUCTION EQUIP	13-56	18 3/4	- 1/8	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	RECORD CORP.	8-34	5 1/2	+ 3/4	+5.7		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	RANDERS ASSOCIATES	7-29	11 1/4	- 1	-8.1		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	SCAN DATA	10-23	11 1/2	- 1 1/2	-15.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	TALLY CORP.	10-23	11 1/2	- 1 1/2	-15.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	TELEX	10-25	18 3/8	- 2 1/2	-11.4		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	VIATRON	2-51	3	- 1/4	-1.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
SUPPLIES & ACCESSORIES													
N	ADAMS-MILLIS CORP	8-15	12 3/4	- 1/4	-1.6		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	BALTIMORE BUS FORMS	7-21	7	- 3/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	BARRY WRIGHT	8-25	7 7/8	- 3/8	-5.5		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
A	DATA DOCUMENTS	10-16	10	- 1/2	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	ENNIS BUS. FORMS	10-16	10	- 1/2	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	ORANMAN MAGNETICS	5-10	9	- 1/2	-5.2		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	GRAPHIC CONTROLS	7-17	9	- 1/2	-5.2		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	HEWLETT	8-18	7 3/4	- 1 1/2	-15.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	SH COMPANY	71-114	88	- 3 1/4	-3.8		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	HOME BUS. FORMS	10-16	10	- 1/2	-10.0		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
N	NASHUA CORP	23-43	28 1/2	- 1/4	-0.8		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	
O	REYNOLDS & REYNOLDS	23-44	37 1/2	- 1	-2.7		O	UNION ELECTRIC	1-3	1 1/8	- 1/4	-4.1	

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Cambridge, Mass. 02138

Earnings Reports

SCANTLIN ELECTRONICS INC.
Nine Months Ended Sept. 30

	1970	1969
Shr Ernd	-----	9.11
Revenue	\$6,870,990	7,069,995
Earnings		
(Loss)	(3,033,871)	234,870

COMPUTER PROPERTY CORP.
Three Months Ended Sept. 30

	1970	1969
Shr Ernd	\$1.15	\$1.14
Revenue	1,062,000	949,000
Earnings	103,000	94,000
9 Mo Shr	.46	.54
Revenue	3,311,000	2,645,000

GENERAL AUTOMATION INC.
Year Ended July 31

	1970	1969
Revenue	\$7,450,000	\$2,000,000
Loss	1,691,000	799,000
3 Mo Rev	2,859,000	\$19,000

UNIVERSITY COMPUTING CO.
Three Months Ended Sept. 30

	1970	1969
Shr Eand	6.61
Revenue	929,326,000	31,048,000
Earnings	-	-
(Loss)	(4,578,000)	4,456,000

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